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This document is submitted in compliance with the requirements of paragraphs B(1.1.1.1.1) and B(1.1.3.1.1)1 of the Statement of Work, System 620A, Exhibit 620A-62-2, dated 26 January 1962, revised 1 August 1962.

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REPORT NO. AA-1661-Y-1

TURBULENT REFERENCE, ROUGHNESS, LEAKAGE AND DEFLECTED-SURFACE HEAT TRANSFER AND PRESSURE TESTS FOR THE BOEING COMPANY CONDUCTED IN THE CAL 48-INCH HYPERSONIC SHOCK TUNNEL

PROJECT NO. AA-1661-Y
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CORNELL AERONAUTICAL LABORATORY, INC.
BUFFALO 21, NEW YORK

REPORT NO. AA-1661-Y-1

TURBULENT REFERENCE, ROUGHNESS, LEAKAGE AND DEFLECTED-SURFACE HEAT TRANSFER AND PRESSURE TESTS FOR THE BOEING COMPANY CONDUCTED IN THE CAL 48-INCH HYPERSONIC SHOCK TUNNEL

PROJECT NO. AA-1661-Y

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D

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SECTION I SUMMARY

During March 1962, hypersonic tests of three basic models were conducted in the CAL 48-inch Hypersonic Shock Tunnel for the Boeing Airplane Company. The tests were run in the 23-inch and 46-inch exit-diameter contoured nozzles of the CAL Tunnel. The three models tested were: a blunt leading-edge model with sweep angles, λ, of 55°, 60° and 65°; a hemisphere-cylinder model; and a sharp flat plate with deflectable rear flap and span extensions. The models are shown in Figs. 2--5.

The objectives of the tests were as follows:

1. To obtain fully turbulent heat transfer rate and pressure data for leading edge, nose and flat surfaces with stream-to-wall property ratios characteristic of Dyna Soar flight conditions.
2. To establish the effect of transverse pressure gradient on roughness and leakage effects with laminar and turbulent boundary layer flow.
3. To define heat transfer, pressure distribution and region of separation for aerodynamic control surfaces.
4. To determine the variation in pressure and heat transfer rate distributions with model attitudes.

Test variables for the models were as follows:

Model	Parameters Varied
Leading Edge Model	Mach number, total temperature, sweep angle, Reynolds number
Hemisphere Cylinder	Mach number, total temperature, angle of attack and roll, Reynolds number
Flat Plate	Mach number, total temperature, angle of attack, flap deflection, flap-gap seal, model span, Reynolds number

Table I is a complete listing of the test procedure and the test variables. The test data are tabulated in Tables II and III and plotted in Figs. 6--35.

SECTION II TEST EQUIPMENT

Shock Tunnel

The hypersonic shock tunnel in which these tests were conducted is described in Refs. 1 and 2. This tunnel employs a constant-area reflected shock tube to process air to conditions suitable for supplying a convergent-divergent hypersonic nozzle. The shock-processed air is expanded through the nozzle to the desired test conditions. The "tailored-interface" technique, wherein the states of the gases on either side of the driver-driven interface are matched, is used to supply test air of sufficient duration to allow accurate measurements of model pressures and temperatures.

Two nozzles were used for this program: (1) a 23-inch exit-diameter contoured nozzle which provides parallel flow in the Mach number range 5 to 8, and (2) a 46-inch exit-diameter contoured nozzle which provides parallel flow in the Mach number range 12 to 18.

The test section is of sufficient length to delay the passage of the reflected shock until after the test period. The speed of the incident shock and the pressure behind the reflected shock are measured for every run and are used to determine the nozzle supply condition.

The tunnel is equipped with two 16-inch diameter optical-quality schlieren windows.

Models

The three models tested were designed and fabricated by the Boeing Airplane Company. It was necessary to modify the model bases to permit routing of electrical leads. Fig. 1 shows the model installations; Figs. 2--4 show the three models and their basic dimensions. Figs. 5--7 are photographs of the three models.

The leading-edge model was equipped with leading-edge extensions, as shown in Fig. 2, in order to maintain a constant gap between the model and the 23-inch exit-diameter nozzle wall.

SECTION II (Cont'd.) TEST EQUIPMENT

Instrumentation

Model pressures were measured by a system developed at CAL to meet the particular requirements of shock-tunnel testing.[6] These transducers are small enough (0.50-inch daimeter) to allow installation at a desired location within the model. They employ piezoelectric crystals and are extremely sensitive, permitting pressures as low as 0.005 psi to be measured. A dual-element feature of the transducer reduces the acceleration sensitivity of the transducer to a measured value of 0.0003 psi/g. A heat shield precludes temperature or radiation effects.

The measurement of heat-transfer rates relies on sensing the transient surface temperature of the model and employs the "thin-film" resistance gage.[8] A strip of platinum is painted on a piece of Pyrex glass which conforms to the local model contours. The gage is then baked at a controlled temperature. The resulting film is approximately 0.1 micron thick and can be considered to have negligible heat capacity and thus high frequency response characteristics.

The outputs from all instrumentation are displayed on oscilloscopes and recorded on film by Polaroid Land cameras.

SECTION III NOMENCLATURE AND SYMBOLS

C_H	Heat transfer rate coefficient = $\frac{778\,\dot{q}}{\rho_\infty U_\infty (H_o - H_w)}$
H	Enthalpy - foot-pounds per slug
K	Thermal conductivity of air - BTU per foot-second - degree Rankine
M	Mach number
p	Pressure - pounds per square inch
q	Dynamic pressure - pounds per square inch
$\dot{q}$	Heat transfer rate - BTU per square foot-second
t	Time - seconds
T	Temperature - degrees Rankine
U	Velocity - feet per second
Z	Compressibility factor of air
R_N/ft.	Reynolds number per foot
α	Angle of attack - degrees
δ_F	Flat plate flap deflection - degree
λ	Leading edge sweep angle - degrees
μ	Absolute viscosity - slugs per foot-second
ξ	Density ratio across a normal shock
ρ	Density - slugs per cubic foot
ϕ	Roll angle - degrees
ψ	Angle of yaw - degrees

Model Designations

LE	Leading edge model, $\lambda = 55^\circ$, no extension
LE_1	Leading edge model, $\lambda = 60^\circ$, extension on
LE_2	Leading edge model, $\lambda = 65^\circ$, extension on

SECTION III (Cont'd.) NOMENCLATURE AND SYMBOLS

FP_s	Flat plate model, flap gap sealed
FP_o	Flat plate model, flap gap open
FP_xS	Flat plate model, span extended
HC	Hemisphere cylinder model

<u>Reference Dimensions for Each Model</u>

<u>Leading Edge Model</u>

$X_{REF.}$ = 15 D = 5.0 feet

D = 4.0 inches = .33 foot = leading edge diameter

<u>Hemisphere Cylinder</u>

$X_{REF.}$ = 8 D = 3.33 feet

D = 5.0 inches = .416 foot = hemisphere diameter

<u>Flat Plate</u>

$X_{REF.}$ = .33 L = .33 foot

L = 12 inches = 1.0 foot = plate length

D = .5 inches = .0416 feet

S	Surface dimension from stagnation point at $\alpha = 0^{o}$ - inches
N	Surface dimension normal to stagnation line - inches
X	Chordwise dimension from leading edge - inches
Y	Spanwise dimension from ℄ of plate - inches

<u>Subscripts</u>

0	Nozzle supply stagnation conditions
0'	Stagnation conditions behind a normal shock
i	Incident shock in driven gas
∞	Free-stream conditions
REF.	Reference
W	Conditions at model wall
aw_t	Adiabatic wall, turbulent
e	Boundary layer edge condition
D	Dissociated gas

SECTION IV TEST PROCEDURE

Calibrations

The pressure transducers are calibrated after installation in each model. The voltage variation of the transducers is linear over the range of pressures normally encountered during testing. These calibrations, in conjunction with estimated values for the pressures to be recorded during the actual test, also provide the basis for adjusting the gain of the oscilloscopes to achieve maximum readability of the traces.

The heat transfer gages are also calibrated prior to the tests. The resistance change of each gage due to an applied temperature rise is recorded; these calibration constants are then used to compute test gain settings.

Complete calibration results and procedures are on record at CAL.

Test Program

The test program comprised 90 runs, including 31 repeated conditions. Table I is a complete listing of the test program including all model and nozzle configurations and test conditions.

Schlieren photographs were taken of every run; the high luminosity that occurred in the test section during the high-density runs caused overexposure and fogging of some of the schlieren pictures. Prints were made of all runs and were supplied to the Boeing Airplane Company.

Runs were repeated if data lost due to faulty film or incorrect gain settings were considered excessive. Repeat runs were made at the discretion of the engineer in charge.

Messrs. R. Hanks and W. Kressner were present during the test program as representatives of the Boeing Airplane Company.

SECTION V DATA REDUCTION

Appendix A presents the standard CAL data reduction procedure and includes graphical and tabulated information used for the test.

In addition to the standard computations, the following reference heat transfer rate was programmed for machine computation:

$$\dot{q}_{REF.} = .534 \frac{k^* R_N^*}{X_{REF.} (\log_{10} R_N^*)^{2.45}} (H_{aw_t} - H_w)$$

with the necessary assumptions and derivations as follows:

$U_e = .928\ U_\infty \sim$ feet per second

$H_e = H_o - 1/2\ U_e^2 \sim$ foot-pounds per slug

$H_{aw_t} = .90\ H_o + .10\ H_e - .04305\ U_\infty^2 \sim$ foot-pounds per slug

$P^* = C_p^*\ q_\infty + p_\infty \sim$ pounds per square inch

C_p^* from Fig. 6 of Appendix A as supplied by BAC

$T^* = 166.5\ (.50\ H_o - .130\ U_\infty^2 + .5\ H_w) \times 10^{-6} \sim$ degrees Rankine

K^* = thermal conductivity at temperature T^* from NASA TR-50, Fig. 7 of Appendix A

$\rho^* = .08392\ P^*/T^* \sim$ slugs per cubic foot

$X_{REF.}$ = reference dimension for each model

The ratio of $\dot{q}_{AVG.}$ divided by $\dot{q}_{REF.}$ was then computed and listed.

Heat transfer ratios other than those listed were originally requested by the Boeing Airplane Company. These ratios were dependent on local conditions for the blunt leading edge or hemisphere cylinder. It was not practical to program these computations because of the excessive time needed for programming the extersive inputs. The Boeing representatives agreed to eliminate these requests.

In the computation of the Fay-Riddell stagnation heat transfer rate, the total temperature behind the normal shock was computed as $T_o' = T_o\left(\frac{T_o'}{T_o}\right)$. The ratio of $\frac{T_o'}{T_o}$ was obtained from Ref. 3, and all values used are listed in Table I.

The computation of the absolute viscosity for a given temperature was obtained from a combination of Sutherland's equation and computations of Hirschfelder, Curtiss and Bird.[9] Fig. 3 in Appendix A shows the viscosity temperature relationship used for all data reduction.

SECTION VI PRESENTATION OF DATA

The data are presented in tabular form in Tables II and III. The data are separated into pressure and heat transfer groups, and these groups are then sub-divided into listings for each model.

The data are plotted in Figs. 6--35 . The plotted data are divided into groupings for each model. The particular divisions for each model are presented in the Figure Index.

Example schlieren photographs are shown in Fig. 5. These photographs were not used for any shock shape comparisons, but the Boeing Airplane Company was supplied with two complete sets of photographs for its own use.

Pressure data for Runs 70, 86, 87, 88 at $\alpha = +15°$ are presented when possible but may not be reliable. Due to the high inertia loading of the transducers compared to the pressure levels, the acceleration sensitivity of the transducers was much greater than the pressure sensitivity; and the outputs were oscillatory and, in general, unreadable.

SECTION VII REFERENCES

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2. Reece, J. W.: "Shock Tube Theory for Real Air with Application to Wind Tunnel Testing and to Flight Simulation," CAL Report WTH-003, October 1958

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6. Martin, J. F.; Duryea, G. R.; Stevenson, L. M.: "Instrumentation for Force and Pressure Measurements in a Hypersonic Shock Tunnel," CAL Report No. 113, January 1962

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8. Vidal, R. J.: "Transient Surface Temperature Measurements," CAL Report No. 114, March 1962

9. Hirschfelder, J. O.; Curtiss, C. F.; and Bird, R. B.: Molecular Theory of Gases and Liquids, John Wiley & Sons, Inc., New York, 1954

TABLE INDEX

TABLE Ia
TEST CONDITIONS

NOZZLE / THROAT DIA.	RUN	CONFIGURATION	SWEEP ANGLE λ DEG.	ANGLE OF ATTACK α DEG.	ROLL ANGLE ϕ DEG.	M_∞	T_o °R	P_o PSI	$R_N/FT \times 10^{-6}$	$\frac{T_o'}{T_o}$
A-2.57	1	LEADING EDGE MODEL	65°	-	-	6.38	2115	3706	13.488	1.00
	2					6.38	2100	3788	13.948	1.00
	3					6.38	2100	4226	15.680	1.00
	4					6.18	3130	3719	6.921	1.00
	5					6.18	3080	3740	7.138	1.00
	6					6.18	3080	3735	7.127	1.00
	7					5.93	4320	3584	3.817	.98
A-1.60	8		55°			7.72	2100	3817	8.342	1.00
	9					6.82	5870	3644	1.212	.98
	10					7.72	2115	3877	8.395	1.00
	11		60°			7.72	2100	3804	8.811	1.00
	12					7.72	2130	3875	8.304	1.00
A-2.57	13					6.17	3170	3929	7.218	1.00
	14					6.18	3130	3794	7.068	1.00
A-1.60	15		65°			7.71	2140	3932	8.293	1.00
A-2.57	16		65°			6.28	2840	3771	9.368	1.00
	17					6.33	2395	3604	10.608	1.00
	18					5.60	5960	3462	1.999	.98
B- .50	19	HEMISPHERE CYLINDER		0	0	13.48	5850	702	.027	.90
	20					13.83	5820	1391	.053	.91
	21					15.48	3820	3000	.249	1.00
	22					14.74	3930	704	.061	1.00
	23			20	0	14.79	3825	673	.061	1.00
	24				180°	14.78	3830	676	.061	1.00
	25				90°	14.70	3960	675	.058	1.00
B- .6	26	HEMISPHERE CYLINDER			270°	15.08	3925	1392	.115	1.00
	27			50	0°	15.09	3926	1402	.115	1.00
	28				180°	15.16	3770	1333	.118	1.00
	29				0°	15.13	3825	1361	.117	1.00
	30	LEADING EDGE MODEL	65°	-	-	15.17	3775	1382	.121	
	31					15.17	3770	1374	.121	
	32					15.20	3775	1494	.130	
	33		60°			15.13	3775	1262	.111	
	34		65°			15.17	3775	1386	.121	
	35					15.18	3775	1394	.122	
	36	SHARP FLAT PLATE	-	0°	FLAP. DEFL.	15.16	3890	1428	.118	
	37	FLAP GAP SEALED			-15°	15.14	3925	1437	.117	
	38				-30°	15.12	3930	1417	.115	
	39				-30°	15.15	3890	1404	.116	
	40				0	15.15	3870	1365	.115	
	41				-45°	15.14	3910	1407	.116	
	42	EXTENDED SPAN			-45°	15.23	3750	1362	.121	
	43	NORMAL SPAN		-15°	0°	15.15	3880	1372	.115	

TABLE Ia

TEST CONDITIONS (Cont.)

	44	FLAP GAP OPEN			0°	15.11	3925	1346	.110	
	45				-15°	15.15	3890	1403	.116	
	46	GAP SEALED			-15°	15.13	3825	1261	.108	
	47				-30°	15.15	3830	1328	.113	
	48	GAP OPEN			-30°	15.07	3925	1267	.105	
	49				-45°	15.16	3870	1838	.113	
	50	GAP SEALED			-45°	15.12	3890	1315	.109	
	51	SHARP PLATE EXTENDED SPAN (SEALED GAP)			FLAP. DEFL. $\delta = -45°$	15.15	3830	1303	.111	
	52	NORMAL SPAN GAP SEALED			+20°	15.14	3870	1303	.110	
	53				+45°	15.10	3930	1332	.108	
	54			+15°	-45°	15.10	3930	1335	.109	
	55				-15°	15.10	3930	1348	.110	
	56				0°	15.10	3925	1307	.107	
	57				-30°	15.07	3910	1241	.103	
	58				-45°	15.08	3930	1311	.107	
A-2.67	59	HEMISPHERE CYLINDER		0°	0°	6.40	2030	3705	14.369	
	60				180°	6.38	2085	3752	13.946	
	61			+10		6.33	2130	3820	13.667	
	62				0°	6.38	2100	3720	13.681	
	63			+20		6.38	2115	3869	14.124	
	64				180°	6.38	2100	3758	13.830	
	65					5.95	4180	3645	4.172	.98
	66				0°	5.61	5950	3785	2.211	.98
	67			0°		5.61	5950	3810	2.223	.98
	68	FLAT PLATE (GAP SEALED)								.98
	69					6.38	2130	3762	13.571	1.00
	70			+15°		6.37	2140	3769	13.383	
	71			-15°		6.38	2090	[illegible]372	14.42[illegible]	
	72						2130	3940	14.258	
	73	FLAP GAP OPEN				6.37	2130	4000	14.403	
	74				-15°	6.38	2120	4039	14.788	
	75	FLAP GAP SEALED					2090	3829	14.252	
	76	FLAT PLATE GAP SEALED			-30	6.38	2130	3933	14.231	
	77				-45		2120	3742	13.630	
	78	EXTENDED SPAN				6.37	2130	3858	13.857	
	79	NORMAL SPAN GAP OPEN				6.38	2130	3887	14.053	
	80	FLAP GAP SEALED			20		2120	3860	14.089	
	81				45		2130	3944	14.273	
	82			0°	-15		2120	3935	14.382	
	83						2130	3928	14.211	
	84				-30°		2130	3898	14.088	
	85				-45°	6.37	2140	3866	13.751	
	86			+15			2140	3858	13.720	
	87				-30		2170	3938	13.748	
	88				-15		2140	3968	14.100	
	89	EXTENDED SPAN		0°	-45		2140	3892	13.849	
	90	NORMAL SPAN		-15°	0	5.93	4310	3635	3.902	.94

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TABLE Ib
TEST CONDITIONS

Run	M_∞	α	ψ	M_i	P_o	$H_o \times 10^{-6}$	q_∞	P_∞	$Re/ft \times 10^{-6}$	P_o'
1	6.38	.00	.00	2.80	3708	13.5	46.2230	1.62226	13.498	85.5318
2	6.38	.00	.00	2.79	3788	13.4	47.3626	1.66225	13.948	87.6364
3	6.38	.00	.00	2.79	4226	13.4	53.2440	1.86866	15.680	98.5190
4	6.18	.00	.00	3.64	3719	21.0	45.3924	1.69788	6.921	84.3103
5	6.18	.00	.00	3.61	3740	20.7	45.9435	1.71850	7.138	85.3225
6	6.18	.00	.00	3.61	3735	20.7	45.8775	1.71603	7.127	85.1998
7	5.93	.00	.00	4.50	3584	30.6	42.2840	1.71779	3.817	78.8378
8	7.72	.00	.00	2.79	3817	13.4	20.7622	.49767	8.342	38.4169
9	6.82	.00	.00	5.51	3644	44.2	17.9108	.55011	1.212	33.5441
10	7.72	.00	.00	2.80	3877	13.5	21.0770	.50521	8.395	39.0011
11	7.72	.00	.00	2.79	3804	13.4	20.6863	.49585	8.311	38.2764
12	7.72	.00	.00	2.81	3875	13.6	21.0314	.50412	8.304	38.9185
13	6.17	.00	.00	3.67	3929	21.3	48.3224	1.81334	7.218	89.7643
14	6.18	.00	.00	3.64	3794	21.0	46.3541	1.73386	7.068	86.0965
15	7.71	.00	.00	2.83	3932	13.7	21.4172	.51470	8.293	39.6359
16	6.28	.00	.00	3.25	3771	17.3	46.3820	1.68009	9.368	85.9986
17	6.33	.00	.00	3.04	3604	15.5	44.5856	1.58960	10.608	82.5903
18	5.60	.00	.00	5.57	3462	45.1	37.7415	1.71927	1.999	70.7026
19	13.48	.00	.00	5.49	702	43.9	.1416	.00111	.027	.2652
20	13.83	.00	.00	5.47	1391	43.7	.2611	.00195	.053	.4889
21	15.48	.00	.00	4.15	3000	26.5	.4726	.00282	.249	.8798

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i4

TABLE Ib
TEST CONDITIONS

Run	M_∞	α	ψ	M_i	P_o	$H_o \times 10^{-6}$	q_∞	P_∞	$Re/ft \times 10^{-6}$	P_o'
22	14.[illegible]4	.00	.00	4.23	704	27.4	.1331	.00088	.061	.2478
23	14.79	20.00	.00	4.16	673	26.6	.1271	.00083	.061	.2366
24	14.78	20.00	.00	4.17	675	26.7	.1277	.00083	.061	.2377
25	14.70	20.00	.00	4.25	675	27.6	.1287	.00085	.058	.2396
26	15.08	20.00	.00	4.22	1392	27.3	.2395	.00150	.115	.4460
27	15.09	50.00	.00	4.22	1402	27.3	.2405	.00151	.115	.4479
28	15.16	50.00	.00	4.12	1333	26.1	.2284	.00142	.118	.4252
29	15.13	50.00	.00	4.16	1361	26.6	.2335	.00146	.117	.4348
30	15.17	.00	.00	4.13	1382	26.2	.2357	.00146	.121	.4388
31	15.17	.00	.00	4.12	1374	26.1	.2348	.00146	.121	.4371
32	15.20	.00	.00	4.13	1494	26.2	.2527	.00156	.130	.4704
33	15.13	.00	.00	4.13	1262	26.2	.2177	.00136	.111	.4053
34	15.17	.00	.00	4.13	1386	26.2	.2364	.00147	.121	.4401
35	15.18	.00	.00	4.13	1394	26.2	.2370	.00147	.122	.4412
36	15.16	.00	.00	4.20	1428	27.1	.2407	.00150	.118	.4481
37	15.14	.00	.00	4.22	1437	27.3	.2427	.00151	.117	.4519
38	15.12	.00	.00	4.23	1417	27.4	.2403	.00150	.115	.4474
39	15.15	.00	.00	4.20	1404	27.1	.2373	.00148	.116	.4418
40	15.15	.00	.00	4.18	1365	26.8	.2317	.00144	.115	.4313
41	15.14	.00	.00	4.21	1407	27.2	.2381	.00148	.116	.4433
42	15.23	.00	.00	4.10	1362	25.9	.2293	.00141	.121	.4268

TABLE Ib
TEST CONDITIONS

Run	M_∞	α	ψ	M_i	P_o	$H_o \times 10^{-6}$	q_∞	P_∞	$Re/ft \times 10^{-6}$	P_o'
43	15.15	-15.00	.00	4.19	1372	26.9	.2324	.00145	.115	.4326
44	15.11	-15.00	.00	4.22	1346	27.3	.2293	.00143	.110	.4270
45	15.15	-15.00	.00	4.20	1403	27.1	.2372	.00148	.116	.4416
46	15.13	-15.00	.00	4.16	1261	26.6	.2161	.00135	.108	.4024
47	15.15	-15.00	.00	4.17	1328	26.7	.2258	.00141	.113	.4204
48	15.07	-15.00	.00	4.22	1267	27.3	.2184	.00137	.105	.4068
49	15.15	-15.00	.00	4.18	1338	26.8	.2270	.00141	.113	.4227
50	15.12	-15.00	.00	4.20	1315	27.1	.2242	.00140	.109	.4175
51	15.15	-15.00	.00	4.17	1303	26.7	.2215	.00138	.111	.4124
52	15.14	-15.00	.00	4.18	1303	26.8	.2217	.00138	.110	.4128
53	15.10	-15.00	.00	4.23	1332	27.4	.2271	.00142	.108	.4230
54	15.10	15.00	.00	4.23	1335	27.4	.2276	.00143	.109	.4238
55	15.10	15.00	.00	4.23	1348	27.4	.2299	.00144	.110	.4280
56	15.10	15.00	.00	4.22	1307	27.3	.2233	.00140	.107	.4157
57	15.07	15.00	.00	4.21	1241	27.2	.2144	.00135	.103	.3992
58	15.08	15.00	.00	4.23	1311	27.4	.2249	.00141	.107	.4189
59	6.40	.00	.00	2.73	3705	12.9	46.1271	1.60879	14.369	85.3275
60	6.38	.00	.00	2.78	3752	13.3	46.9579	1.64805	13.946	86.8837
61	6.38	10.00	.00	2.82	3820	13.6	47.5600	1.66918	13.657	88.0136
62	6.38	10.00	.00	2.79	3720	13.4	46.4566	1.63045	13.681	85.9600
63	6.38	20.00	.00	2.80	3869	13.5	48.3672	1.69751	14.124	89.4993

TABLE Ib

TEST CONDITIONS

Run	M_∞	α	ψ	M_j	P_o	$H_o \times 10^{-6}$	q_∞	P_∞	$Re/ft \times 10^{-6}$	P_o'
64	6.38	20.00	.00	2.79	3758	13.4	46.9624	1.64820	13.830	86.8959
65	5.95	20.00	.00	4.42	3645	29.6	44.1936	1.78331	4.172	82.3690
66	5.61	20.00	.00	5.55	3785	44.8	41.3505	1.87697	2.211	77.4567
67	5.61	.00	.00	5.55	3810	44.8	41.5690	1.88689	2.223	77.8660
69	6.38	.00	.00	2.81	3762	13.6	46.8657	1.64481	13.571	86.7248
70	6.37	15.00	.00	2.83	3769	13.7	47.1081	1.65851	13.383	87.1811
71	6.38	-15.00	.00	2.78	3872	13.3	48.5628	1.70437	14.423	89.8532
72	6.38	-15.00	.00	2.81	3940	13.6	49.2372	1.72804	14.258	91.1132
73	6.37	-15.00	.00	2.82	4000	13.6	50.2790	1.77015	14.403	93.0453
74	6.38	-15.00	.00	2.80	4039	13.5	50.6426	1.77737	14.788	93.7098
75	6.38	-15.00	.00	2.78	3829	13.3	47.9873	1.68417	14.252	88.7884
76	6.38	-15.00	.00	2.81	3933	13.6	49.1444	1.72479	14.231	90.9416
77	6.38	-15.00	.00	2.80	3742	13.5	46.6744	1.63810	13.630	86.3670
78	6.37	-15.00	.00	2.82	3858	13.6	48.3736	1.70307	13.857	89.5192
79	6.38	-15.00	.00	2.81	3887	13.6	48.5296	1.70321	14.053	89.8039
80	6.38	-15.00	.00	2.80	3860	13.5	48.2477	1.69331	14.089	89.2782
81	6.38	-15.00	.00	2.81	3944	13.6	49.2908	1.72992	14.273	91.2125
82	6.38	.00	.00	2.80	3935	13.5	49.2506	1.72851	14.382	91.1339
83	6.38	.00	.00	2.81	3928	13.6	49.0773	1.72243	14.211	90.8173
84	6.38	.00	.00	2.81	3896	13.6	48.6503	1.70744	14.088	90.0272
85	6.37	.00	.00	2.83	3866	13.7	48.4030	1.70410	13.751	89.5776

TABLE Ib

TEST CONDITIONS

Run	M_∞	α	ψ	M_j	P_o	$H_o \times 10^{-6}$	q_∞	P_∞	$Re/ft \times 10^{-6}$	P_o'
56	6.37	15.00	.00	2.83	3858	13.7	48.2954	1.70031	13.720	89.3785
87	6.37	15.00	.00	2.85	3938	13.9	49.2050	1.73234	13.748	91.0700
88	6.37	15.00	.00	2.83	3958	13.7	49.6337	1.74743	14.100	91.8553
89	6.37	.00	.00	2.83	3892	13.7	48.7501	1.71632	13.849	90.2200
90	5.93	-15.00	.00	4.49	3635	30.5	43.0009	1.74691	3.902	80.1709

TABLE Ic
TEST CONDITIONS

Run	M_∞	α	ψ	U_∞	T_∞	$\rho_\infty \times 10^6$	T_o
1	6.38	.00	.00	4898	245.4	554.8107	2115
2	6.38	.00	.00	4884	243.9	571.8718	2100
3	6.38	.00	.00	4884	243.9	642.8864	2100
4	6.18	.00	.00	6093	404.6	352.1395	3130
5	6.18	.00	.00	6049	398.8	361.6092	3080
6	6.18	.00	.00	6049	398.8	361.0892	3080
7	5.93	.00	.00	7322	634.6	227.1467	4320
8	7.72	.00	.00	4971	172.6	241.9952	2100
9	6.82	.00	.00	8938	715.0	64.5659	5870
10	7.72	.00	.00	4985	173.6	244.2108	2115
11	7.72	.00	.00	4971	172.6	241.1106	2100
12	7.72	.00	.00	5000	174.6	242.2453	2130
13	6.17	.00	.00	6135	411.7	369.6585	3170
14	6.18	.00	.00	6093	404.6	359.6000	3130
15	7.71	.00	.00	5029	177.1	243.8488	2140
16	6.28	.00	.00	5535	323.4	435.9994	2640
17	6.33	.00	.00	5241	285.4	467.3728	2395
18	5.60	.00	.00	8822	1033.3	139.6308	5960
19	13.48	.00	.00	9248	196.0	.4769	5850
20	13.83	.00	.00	9223	185.2	.8838	5820
21	15.48	.00	.00	7202	90.1	2.6241	3820

TABLE Ic

TEST CONDITIONS

Run	M_∞	α	ψ	U_∞	T_∞	$\rho_\infty \times 10^6$	T_o
22	14.74	.00	.00	7318	102.6	.7157	3930
23	14.79	20.00	.00	7210	98.9	.7042	3825
24	14.78	20.00	.00	7225	99.5	.7041	3830
25	14.70	20.00	.00	7348	104.0	.6862	3960
26	15.08	20.00	.00	7306	97.7	1.2922	3925
27	15.09	50.00	.00	7306	97.6	1.2975	3925
28	15.16	50.00	.00	7152	92.7	1.2860	3770
29	15.13	50.00	.00	7214	94.6	1.2924	3825
30	15.17	.00	.00	7168	92.9	1.3214	3775
31	15.17	.00	.00	7152	92.5	1.3221	3770
32	15.20	.00	.00	7168	92.6	1.4162	3775
33	15.13	.00	.00	7167	93.4	1.2206	3775
34	15.17	.00	.00	7168	92.9	1.3251	3775
35	15.18	.00	.00	7168	92.8	1.3286	3775
36	15.16	.00	.00	7276	95.9	1.3091	3890
37	15.14	.00	.00	7307	97.0	1.3090	3925
38	15.12	.00	.00	7322	97.6	1.2905	3930
39	15.15	.00	.00	7276	96.0	1.2909	3890
40	15.15	.00	.00	7245	95.2	1.2711	3870
41	15.14	.00	.00	7291	96.6	1.2896	3910
42	15.23	.00	.00	7122	91.0	1.3021	3750

TABLE I c

TEST CONDITIONS

Run	M_∞	α	ψ	U_∞	T_∞	$\rho_\infty \times 10^6$	T_o
43	15.15	-15.00	.00	7260	95.6	1.2694	3880
44	15.11	-15.00	.00	7306	97.3	1.2370	3925
45	15.15	-15.00	.00	7276	96.0	1.2902	3890
46	15.13	-15.00	.00	7214	94.6	1.1961	3825
47	15.15	-15.00	.00	7229	94.8	1.2441	3830
48	15.07	-15.00	.00	7306	97.9	1.1786	3925
49	15.15	-15.00	.00	7245	95.2	1.2457	3870
50	15.12	-15.00	.00	7276	96.4	1.2199	3890
51	15.15	-15.00	.00	7229	94.8	1.2206	3830
52	15.14	-15.00	.00	7245	95.3	1.2165	3870
53	15.10	-15.00	.00	7322	97.9	1.2200	3930
54	15.10	15.00	.00	7322	97.9	1.2226	3930
55	15.10	15.00	.00	7322	97.9	1.2347	3930
56	15.10	15.00	.00	7306	97.5	1.2044	3925
57	15.07	15.00	.00	7290	97.4	1.1616	3910
58	15.08	15.00	.00	7322	98.1	1.2084	3930
59	6.40	.00	.00	4798	234.0	576.9652	2030
60	6.38	.00	.00	4869	242.5	570.3703	2085
61	6.38	10.00	.00	4927	248.3	564.1528	2130
62	6.38	10.00	.00	4884	243.9	560.9324	2100
63	6.38	20.00	.00	4898	245.4	580.5468	2115

TABLE I c
TEST CONDITIONS

Run	M_∞	α	ψ	U_∞	T_∞	$\rho_\infty \times 10^6$	T_o
64	6.38	20.00	.00	4884	243.9	567.0395	2100
65	5.95	20.00	.00	7207	610.9	244.9946	4190
66	5.61	20.00	.00	8795	1023.4	153.9211	5950
67	5.61	.00	.00	8795	1023.4	154.7344	5950
69	6.38	.00	.00	4913	246.8	559.2061	2130
70	6.37	15.00	.00	4941	250.5	555.7067	2140
71	6.38	-15.00	.00	4869	242.5	589.8641	2090
72	6.38	-15.00	.00	4913	246.8	587.5024	2130
73	6.37	-15.00	.00	4926	249.0	596.6104	2130
74	6.38	-15.00	.00	4898	245.4	6 7.8585	2120
75	6.38	-15.00	.00	4869	242.5	582.8737	2090
76	6.38	-15.00	.00	4913	246.8	586.3962	2130
77	6.38	-15.00	.00	4898	245.4	560.2287	2120
78	6.37	-15.00	.00	4926	249.0	574.0009	2130
79	6.38	-15.00	.00	4913	246.8	579.0600	2130
80	6.38	-15.00	.00	4398	245.4	579.1119	2120
81	6.38	-15.00	.00	4913	246.8	588.1431	2130
82	6.38	.00	.00	4898	245.4	591.1496	2120
83	6.38	.00	.00	4913	246.8	585.5947	2130
84	6.38	.00	.00	4913	246.8	580.4999	2130
85	6.37	.00	.00	4941	250.5	570.9818	2140

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TABLE I c

TEST CONDITIONS

Run	M_∞	α	ψ	U_∞	T_∞	$\rho_\infty \times 10^6$	T_o
86	6.37	15.00	.00	4941	250.5	569.7129	2140
87	6.37	15.00	.00	4970	253.4	573.6867	2170
88	6.37	15.00	.00	4941	250.5	585.5002	2140
89	6.37	.00	.00	4941	250.5	575.0772	2140
90	5.93	-15.00	.00	7307	632.1	231.9259	4310

TABLE IIa

PRESSURE DATA LEADING EDGE MODEL

Run	M_∞	α	ψ	Press. No.	p_m	$\frac{p_m}{p_\infty}$	c_p	$\frac{p_m}{p_0}$
4	6.18	.00	.00	14	1.7658	1.0400	.0015	.0209
				15	1.7342	1.0214	.0008	.0206
				16	1.3434	.7912	-.0078	.0159
				19	1.6854	.9926	-.0003	.0200
				21	13.3059	7.8367	.2557	.1578
				23	14.3640	8.4599	.2790	.1704
				31	1.4050	.8275	-.0065	.0167
				33	1.4690	.8652	-.0050	.0174
5	6.18	.00	.00	10	14.1980	8.2618	.2716	.1664
				11	6.3201	3.6777	.1002	.0741
				14	1.5505	.9023	-.0037	.0182
				31	1.3287	.7731	-.0085	.0156
				32	1.4033	.8166	-.0069	.0164
				33	1.3562	.7892	-.0079	.0159
				34	.7735	.4501	-.0206	.0091
				36	1.7539	1.0206	.0008	.0206
6	6.18	.00	.00	9	16.2121	9.4475	.3160	.1903
				15	1.7299	1.0081	.0003	.0203
				16	1.2793	.7455	-.0095	.0150
				17	1.3334	.7770	-.0083	.0157
				18	15.6075	9.0951	.3028	.1832
				19	1.5930	.9283	-.0027	.0187
				21	12.5329	7.3034	.2358	.1471
				23	14.1699	8.2574	.2715	.1663
				25	1.9752	1.1510	.0056	.0232
				26	1.7041	.9931	-.0003	.0200
				27	1.6643	.9698	-.0011	.0195
7	5.93	.00	.00	9	15.7315	9.1580	.3314	.1995
				14	1.6508	.9610	-.0016	.0209
				15	1.6912	.9845	-.0006	.0215
				16	1.3450	.7830	-.0088	.0171
				19	1.6298	.9488	-.0021	.0207
				21	12.3391	.7183	.2512	.1565
				23	13.8101	8.0395	.2860	.1752
				31	1.3611	.7924	-.0084	.0173
				33	1.4975	.8718	-.0052	.0190
8	7.72	.00	.00	8	12.9412	26.0037	.5993	.3369
				9	11.7426	23.5952	.5416	.3057
				10	9.6345	19.3593	.4401	.2508
				11	3.9030	7.8427	.1640	.1016
				14	.9816	1.9724	.0233	.0256
				18	11.5456	23.1994	.5321	.3005
				31	.7165	1.4397	.0105	.0187
				33	.7770	1.5613	.0135	.0202
9	6.82	.00	.00	8	11.9445	21.7129	.6362	.3561
				14	.9614	1.7477	.0230	.0287
				15	.8847	1.6083	.0187	.0264
				16	.6883	1.2513	.0077	.0205
				19	1.8711	3.4014	.0738	.0558
				21	10.2395	18.6136	.5410	.3053
				33	.8209	1.4922	.0151	.0245
10	7.72	.00	.00	8	12.4878	24.7178	.5685	.3202
				15	.9356	1.8519	.0204	.0240
				16	.7982	1.5800	.0139	.0205
				17	.7490	1.4825	.0116	.0192
				18	10.3700	20.5259	.4680	.2659
				19	1.5884	3.1439	.0514	.0407
				21	10.0107	19.8148	.4510	.2567

TABLE IIa

PRESSURE DATA - LEADING EDGE MODEL

Run	M_∞	α	ψ	Press. No.	p_m	$\frac{p_m}{p_\infty}$	c_p	$\frac{p_m}{p_o'}$
10	7.72	.00	.00	23	11.2919	22.3507	.5118	.2895
				25	1.5562	3.0803	.0499	.0399
				26	.9264	1.8336	.0200	.0238
				27	.9558	1.8918	.0214	.0245
11	7.72	.00	.00	8	9.7466	19.6565	.4472	.2546
				9	8.8571	17.8626	.4042	.2314
				10	7.7152	15.5596	.3490	.2016
				11	3.2073	6.4683	.1311	.0838
				31	.5853	1.1804	.0043	.0153
				32	.5886	1.1871	.0045	.0154
				33	.5297	1.0682	.0016	.0138
				34	.5226	1.0540	.0013	.0137
				36	.7514	1.5153	.0124	.0196
12	7.72	.00	.00	8	9.9020	19.6421	.4469	.2544
				9	9.2993	18.4466	.4182	.2389
				15	.7563	1.5002	.0120	.0194
				16	.6551	1.2995	.0072	.0168
				17	.6377	1.2649	.0064	.0164
				21	7.4884	14.8543	.3321	.1924
				23	8.4216	16.7055	.3765	.2164
				25	1.1115	2.2048	.0289	.0286
				26	.7159	1.4202	.0101	.0184
				27	.7570	1.5017	.0120	.0195
13	6.17	.00	.00	8	23.5295	12.9758	.4494	.2621
				15	2.2225	1.2256	.0085	.0248
				16	1.7208	.9490	-.0019	.0192
				17	1.7655	.9736	-.0010	.0197
				18	18.7085	10.3171	.3496	.2084
				19	2.4284	1.3392	.0127	.0271
				21	17.4752	9.6370	.3241	.1947
				23	19.7915	10.9146	.3721	.2205
				25	2.8323	1.5619	.0211	.0316
				26	1.9239	1.0610	.0023	.0214
				27	1.9664	1.0844	.0032	.0219
14	6.18	.00	.00	8	22.3156	12.8705	.4440	.2592
				9	21.2027	12.2286	.4200	.2463
				10	16.8791	9.7350	.3267	.1960
				11	7.5054	4.3287	.1245	.0872
				14	1.8429	1.0629	.0024	.0214
				18	19.5589	11.2806	.3845	.2272
				31	1.7247	.9947	-.0002	.0200
				32	1.7307	.9982	-.0001	.0201
				33	1.8178	1.0484	.0018	.0211
15	7.71	.00	.00	8	7.6396	14.8428	.3327	.1927
				14	.6457	1.2545	.0061	.0163
				15	.6142	1.1933	.0046	.0155
				16	.5153	1.0012	.0000	.0130
				19	.8222	1.5974	.0144	.0207
				21	5.1827	10.0693	.2180	.1308
				23	6.1465	11.9418	.2630	.1551
				31	.4697	.9126	-.0021	.0119
				33	.5002	.9718	-.0007	.0126
16	6.28	.00	.00	8	26.9308	16.0294	.5444	.3132
				14	2.2706	1.3515	.0127	.0264
				19	3.6511	2.1732	.0425	.0425
				25	3.5089	2.0885	.0394	.0408
				27	2.1734	1.2936	.0106	.0253
				31	1.8684	1.1121	.0041	.0217

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TABLE II a

PRESSURE DATA - LEADING EDGE MODEL

Run	M_∞	α	ψ	Press. No.	p_m	$\frac{p_m}{p_\infty}$	c_p	$\frac{p_m}{p_o'}$
16	6.28	.00	.00	33	1.8002	1.0715	.0026	.0209
				34	1.0493	.6246	-.0136	.0122
				36	1.8734	1.1150	.0042	.0218
17	6.33	.00	.00	8	28.5847	17.9823	.6055	.3461
				9	26.0308	16.3757	.5482	.3152
				14	2.2938	1.4430	.0158	.0278
				15	2.3550	1.4815	.0172	.0285
				16	1.8983	1.1942	.0069	.0230
				19	3.8282	2.4082	.0502	.0464
				21	22.1743	13.9496	.4617	.2685
				23	25.0959	15.7875	.5272	.3039
				33	1.8121	1.1400	.0050	.0219
18	5.60	.00	.00	8	27.3320	15.8974	.6786	.3866
				10	20.7362	12.0610	.5039	.2933
				14	2.5022	1.4554	.0207	.0354
				15	2.6050	1.5500	.0251	.0377
				16	2.1979	1.2784	.0127	.0311
				18	23.3469	13.5795	.5730	.3302
				19	3.5802	2.0824	.0493	.0506
				21	24.3240	14.1478	.5989	.3440
				23	26.4058	15.3587	.6541	.3735
				33	2.2008	1.2801	.0128	.0311
30	15.17	.00	.00	8	.1471	100.5324	.6179	.3353
				11	.0474	32.4174	.1950	.1081
				12	.0127	8.7110	.0479	.0291
				14	.0132	9.0159	.0498	.0301
				31	.0117	7.9708	.0433	.0266
				33	.0078	5.3055	.0267	.0177
				34	.0146	9.9432	.0555	.0332
				36	.0131	8.9734	.0495	.0299
31	15.17	.00	.00	8	.1376	94.3579	.5796	.3147
				15	.0127	8.6911	.0477	.0290
				16	.0117	8.0414	.0437	.0268
				17	.0097	6.6628	.0352	.0222
				18	.1280	87.8212	.5390	.2929
				19	.0378	25.9027	.1546	.0864
				21	.1059	72.6506	.4448	.2423
				23	.1218	83.5305	.5123	.2786
				25	.0305	20.9184	.1237	.0698
				27	.0100	6.8540	.0363	.0229
32	15.20	.00	.00	8	.1439	92.0971	.5634	3060
				15	.0135	8.6397	.0472	.0287
				16	.0119	7.6469	.0411	.0254
				17	.0100	6.3928	.0334	.0212
				18	.1329	85.0557	.5198	.2826
				19	.0403	25.7886	.1533	.0857
				21	.1087	69.5497	.4239	.2311
				23	.1263	80.8089	.4936	.2685
				25	.0315	20.1604	.1185	.0670
				27	.0103	6.6018	.0346	.0219
33	15.13	.00	.00	8	.1084	79.7810	.4918	.2676
				14	.0102	7.4806	.0405	.0251
				15	.0102	7.4850	.0405	.0251
				16	.0095	6.9985	.0374	.0235
				18	.1001	73.6666	.4536	.2470
				25	.0245	17.9948	.1061	.0603
				27	.0076	5.6215	.0289	.0189
				31	.0036	2.6789	.0105	.0090

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TABLE II a

PRESSURE DATA - LEADING EDGE MODEL

Run	M_∞	α	ψ	Press. No.	p_m	$\frac{p_m}{p_\infty}$	c_p	$\frac{p_m}{p_o'}$
33	15.13	.00	.00	33	.0061	4.4827	.0217	.0150
34	15.17	.00	.00	8	.0797	54.3176	.3310	.1812
				11	.0267	18.1702	.1066	.0606
				12	.0078	5.3238	.0268	.0178
				14	.0080	5.4412	.0276	.0181
				31	.0025	1.7350	.0046	.0058
				33	.0044	3.0292	.0126	.0101
				34	.0083	5.6638	.0290	.0189
				36	.0083	5.6584	.0289	.0189
35	15.18	.00	.00	8	.0792	53.9356	.3281	.1796
				15	.0081	5.5413	.0282	.0185
				16	.0076	5.1610	.0258	.0172
				17	.0058	3.9802	.0185	.0133
				18	.0747	50.8599	.3091	.1694
				19	.0218	14.8595	.0859	.0495
				21	.0519	35.2898	.2126	.1175
				23	.0608	41.4033	.2504	.1379
				25	.0187	12.7455	.0728	.0424
				27	.0061	4.1618	.0196	.0139

TABLE IIb

PRESSURE DATA - HEMISPHERE-CYLINDER MODEL

Run	M_∞	α	ψ	Press. No.	p_m	$\frac{p_m}{p_\infty}$	c_p	$\frac{p_m}{p_o'}$
19	13.48	.00	.00	1	.2522	226.5388	1.7730	.9510
				3	.1434	128.7638	1.0044	.5405
				5	.2120	190.4330	1.4892	.7994
				7	.0143	12.8291	.0930	.0539
				8	.0111	9.9681	.0705	.0418
				9	.0110	9.8348	.0695	.0413
20	13.83	.00	.00	1	.4326	221.8288	1.6496	.8850
				2	.4233	217.0727	1.6141	.8660
				4	.0495	25.3897	.1822	.1013
				6	.1128	57.8370	.4246	.2307
				9	.0179	9.1530	.0609	.0365
				13	.0167	8.5856	.0567	.0343
				14	.0187	9.5657	.0640	.0382
				15	.0131	6.7178	.0427	.0268
				16	.0132	6.7527	.0430	.0269
				17	.0158	8.1148	.0531	.0324
				24	.2515	128.9638	.9559	.5145
				25	.2325	119.2107	.8830	.4756
				26	.0241	12.3737	.0850	.0494
21	15.48	.00	.00	1	.8024	284.8400	1.6918	.9120
				3	.4197	149.0019	.8821	.4771
				5	.6582	233.6469	1.3867	.7481
				7	.0409	14.5300	.0806	.0465
				8	.0333	11.8321	.0646	.0379
				9	.0309	10.9830	.0595	.0352
				11	.0204	7.2259	.0371	.0231
22	14.74	.00	.00	1	.2308	263.7944	1.7280	.9314
				3	.1222	139.6929	.9120	.4932
				5	.1926	220.1243	1.4408	.7772
				7	.0129	14.7420	.0904	.0521
				8	.0100	11.4782	.0689	.0405
				9	.0091	10.4230	.0620	.0368
				11	.0060	6.8453	.0384	.0242
23	14.79	20.00	.00	2	.2404	289.5199	1.8852	1.0161
				6	.0221	26.6107	.1673	.0934
				7	.0035	4.2383	.0212	.0149
				9	.0025	3.0645	.0135	.0108
				11	.0033	3.9790	.0195	.0140
				13	.0325	39.0763	.2488	.1371
				14	.0323	38.8998	.2476	.1365
				15	.0308	37.0377	.2355	.1300
				16	.0292	35.1683	.2233	.1234
				17	.0304	36.5536	.2323	.1283
				26	.0115	13.7961	.0836	.0484
24	14.78	20.00	.00	1	.2429	290.8529	1.8960	1.0219
				3	.0467	55.9256	.3593	.1965
				4	.0076	9.1507	.0533	.0322
				5	.2294	274.7502	1.7906	.9653
				7	.0395	47.3547	.3032	.1664
				8	.0332	39.7281	.2533	.1396
				9	.0307	36.7805	.2340	.1292
				11	.0223	26.7186	.1682	.0939
				24	.0875	104.7720	.6788	. 681
				25	.1004	120.2411	.7800	.4225
25	14.70	20.00	.00	2	.1651	194.1289	1.2766	.6890
				13	.0077	9.0796	.0534	.0322
				14	.0091	10.6823	.0640	.0379
				15	.0087	10.2571	.0612	.0364

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TABLE IIb

PRESSURE DATA - HEMISPHERE-CYLINDER MODEL

Run	M_∞	α	ψ	Press. No.	p_m	$\frac{p_m}{p_\infty}$	c_p	$\frac{p_m}{p_o'}$
25	14.70	20.00	.00	16	.0066	7.7805	.0448	.0276
				17	.0077	9.0410	.0532	.032[illegible]
				24	.2054	241.4582	1.5894	.8570
				25	.2097	246.5472	1.6231	.8751
				26	.0429	50.3996	.3265	.1789
26	15.08	20.00	.00	1	.3394	225.5397	1.4107	.7609
				7	.0181	12.0404	.0694	.0406
				13	.0201	13.3372	.0775	.0450
				14	.0204	13.5647	.0789	.0458
				15	.0167	11.0868	.0634	.0374
				17	.0186	12.3910	.0716	.0418
				24	.1116	74.1638	.4597	.2502
				25	.0976	64.8755	.4013	.2189
				26	.0063	4.1805	.0200	.0141
27	15.09	50.00	.00	1	.0635	42.0746	.2576	.1417
				2	.3138	207.9875	1.2983	.7006
				3	.4312	285.8279	1.7865	.9627
				4	.3236	214.5021	1.3391	.7225
				5	.0339	22.4459	.1345	.0756
				6	.0057	3.8062	.0176	.0128
				7	.0020	1.3072	.0019	.0044
				11	.0027	1.7693	.0048	.0060
				13	.2433	161.2870	1.0054	.5433
				14	.2604	172.6058	1.0764	.5814
				15	.2664	176.5668	1.1012	.5947
				16	.2710	179.6663	1.1206	.6052
				17	.2730	180.9716	1.1288	.6096
28	15.16	50.00	.00	1	.3130	220.5150	1.3643	.7363
				2	.0627	44.1734	.2683	.1475
				3	.0128	9.0307	.0499	.0302
				4	.0021	1.4982	.0031	.0050
				5	.3753	264.3803	1.6369	.8828
				6	.4129	290.8239	1.8013	.9711
				7	.2471	174.0344	1.0754	.5811
				8	.2518	177.3531	1.0960	.5922
				9	.2590	182.4807	1.1279	.6093
				10	.1548	109.0192	.6713	.3640
				11	.2569	180.9589	1.1184	.6042
				13	.0027	1.9320	.0058	.0065
				17	.0033	2.2904	.0080	.0076
				24	.0879	61.8893	.3784	.2066
				25	.0867	61.0782	.3734	.2039
29	15.13	50.00	.00	1	.0656	44.9963	.2746	.1509
				2	.3145	215.7729	1.3405	.7234
				3	.4340	297.7361	1.8521	.9982
				4	.3288	225.5529	1.4016	.7562
				5	.0354	24.2658	.1452	.0814
				6	.0053	3.6277	.0164	.0122
				7	.0015	1.0209	.0001	.0034
				11	.0030	2.0307	.0064	.0068
				13	.2487	170.6449	1.0588	.5721
				14	.2622	179.8750	1.1165	.6031
				15	.2721	186.6542	1.1588	.6258
				16	.2730	187.2599	1.1626	.6278
				17	.2658	182.3260	1.1318	.6113
59	6.40	.00	.00	1	63.0222	39.1738	1.3314	.7386
				3	34.3085	21.3257	.7089	.4021
				5	52.4683	32.6136	1.1026	.6149
				7	3.5013	2.1763	.0410	.0410

TABLE IIb

PRESSURE DATA - HEMISPHERE-CYLINDER MODEL

Run	M_∞	α	ψ	Press. No.	p_m	$\frac{p_m}{p_\infty}$	c_p	$\frac{p_m}{p_o'}$
59	6.40	.00	.00	9	2.7684	1.7208	.0251	.0324
				11	2.4073	1.4963	.0173	.0282
				24	38.1811	23.7329	.7929	.4475
				26	3.3660	2.0923	.0381	.0394
60	6.38	.00	.00	1	66.7543	40.5052	1.3865	.7683
				4	9.4518	5.7352	.1662	.1088
				6	20.2988	12.3169	.3972	.2336
				8	2.9547	1.7929	.0278	.0340
				10	2.8484	1.7284	.0256	.0328
				12	1.9695	1.1950	.0068	.0227
				13	2.9068	1.7638	.0268	.0335
				14	2.6991	1.6377	.0224	.0311
				15	3.0940	1.8774	.0308	.0356
				16	2.9744	1.8048	.0282	.0342
				17	2.9953	1.8175	.0287	.0345
				25	38.5758	23.4070	.7864	.4440
61	6.38	10.00	.00	1	75.5050	45.2349	1.5525	.8579
				3	25.5886	15.3301	.5029	.2907
				4	5.3250	3.1902	.0769	.0605
				7	7.4189	4.4447	.1209	.0843
				8	6.0954	3.6517	.0931	.0693
				9	5.6839	3.4052	.0844	.0646
				10	5.4436	3.2613	.0794	.0619
				11	4.1741	2.5007	.0527	.0474
				12	3.4116	2.0439	.0366	.0388
				13	1.4259	.8543	-.0051	.0162
				14	1.6915	1.0134	.0005	.0192
				24	40.5517	24.2945	.8175	.4607
62	6.38	10.00	.00	2	74.9538	45.9712	1.5783	.8720
				6	11.2746	6.9150	.2076	.1312
				7	1.6280	.9985	-.0001	.0189
				9	1.4704	.9019	-.0034	.0171
				11	1.7232	1.0569	.0020	.0200
				13	5.4957	3.3706	.0832	.0639
				14	5.1932	3.1851	.0767	.0604
				15	5.6062	3.4384	.0856	.0652
				16	5.4826	3.3626	.0829	.0638
				17	5.3040	3.2531	.0791	.0617
63	6.38	20.00	.00	2	74.3842	43.8196	1.5028	.8311
				6	7.0496	4.1529	.1107	.0788
				7	.8955	.5275	-.0166	.0100
				9	.7602	.4478	-.0194	.0085
				11	1.4564	.8580	-.0050	.0163
				13	10.5876	6.2371	.1838	.1183
				14	9.6840	5.7048	.1651	.1082
				15	10.6379	6.2668	.1848	.1189
				16	10.6566	6.2778	.1852	.1191
				17	10.9579	6.4553	.1915	.1224
				24	33.9780	20.0164	.6674	.3796
				25	34.7081	20.4465	.6825	.3878
64	6.38	20.00	.00	1	74.5512	45.2319	1.5524	.8579
				3	15.3255	9.2983	.2912	.1764
				7	17.7091	10.7445	.3420	.2038
				8	11.0353	6.6953	.1999	.1270
				9	10.5335	6.3909	.1892	.1212
				10	10.1302	6.1462	.1806	.1166
				11	7.7840	4.7227	.1307	.0896
				12	7.5764	4.5968	.1262	.0872
				24	44.0186	26.7070	.9022	.5066

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TABLE IIb

PRESSURE DATA - HEMISPHERE-CYLINDER MODEL

Run	M_∞	α	ψ	Press. No.	p_m	$\frac{p_m}{p_\infty}$	c_p	$\frac{p_m}{p_o'}$
64	6.38	20.00	.00	25	36.1321	21.9221	.7343	.4158
65	5.95	20.00	.00	1	72.7868	40.8155	1.6066	.8837
				3	15.8406	8.8827	.3181	.1923
				4	2.6910	1.5090	.0205	.0327
				7	13.9527	7.8240	.2754	.1694
				8	11.5573	6.4808	.2212	.1403
				9	10.7073	6.0041	.2019	.1300
				10	10.4217	5.8440	.1955	.1265
				11	8.3053	4.6572	.1476	.1008
				12	7.9954	4.4334	.1406	.0971
				14	.8475	.4752	-.0212	.0103
				24	34.9996	19.6262	.7516	.4249
				25	35.0697	19.6655	.7532	.4258
66	5.61	20.00	.00	2	68.4664	36.4771	1.6104	.8839
				3	63.1413	33.6400	1.4816	.8152
				6	7.0937	3.7794	.1262	.0916
				7	1.0098	.5380	-.0210	.0130
				9	.8158	.4346	-.0257	.0105
				11	1.6030	.8540	-.0066	.0207
				13	10.4963	5.5921	.2084	.1355
				14	11.6047	6.1827	.2352	.1498
				15	11.0059	5.8636	.2208	.1421
				16	11.0726	5.8992	.2224	.1430
				17	10.6971	5.6991	.2133	.1381
				24	32.7024	17.4230	.7455	.4222
				25	38.9348	20.7434	.8962	.5027
67	5.61	.00	.00	2	67.2889	35.6613	1.5733	.8642
				3	40.2725	21.3434	.9234	.5172
				6	23.0090	12.1942	.5081	.2955
				13	3.2360	1.7150	.0325	.0416
				14	3.8379	2.0340	.0469	.0493
				15	3.5824	1.8986	.0408	.0460
				16	3.3182	1.7586	.0344	.0426
				17	3.1712	1.6807	.0309	.0407
				24	43.4859	23.0464	1.0007	.5585
				25	45.1390	23.9225	1.0405	.5797
				26	3.9247	2.0800	.0490	.0504

TABLE IIb

PRESSURE DATA - HEMISPHERE-CYLINDER MODEL

Run	M_∞	α	ψ	Press. No.	p_m	$\frac{p_m}{p_\infty}$	c_p	$\frac{p_m}{p_o'}$
64	6.38	20.00	.00	25	36.1321	21.9221	.7343	.4158
65	5.95	20.00	.00	1	72.7868	40.8155	1.6066	.8837
				3	15.8406	8.8827	.3181	.1923
				4	2.6910	1.5090	.0205	.0327
				7	13.9527	7.8240	.2754	.1694
				8	11.5573	6.4808	.2212	.1403
				9	10.7073	6.0041	.2019	.1300
				10	10.4217	5.8440	.1955	.1265
				11	8.3053	4.6572	.1476	.1008
				12	7.9954	4.4834	.1406	.0971
				14	.8475	.4752	-.0212	.0103
				24	34.9996	19.6262	.7516	.4249
				25	35.0697	19.6655	.7532	.4258
66	5.61	20.00	.00	2	68.4664	36.4771	1.6104	.8839
				3	63.1413	33.6400	1.4816	.8152
				6	7.0937	3.7794	.1262	.0916
				7	1.0098	.5380	-.0210	.0130
				9	.8158	.4346	-.0257	.0105
				11	1.6030	.8540	-.0066	.0207
				13	10.4963	5.5921	.2084	.1355
				14	11.6047	6.1827	.2352	.1498
				15	11.0059	5.8636	.2208	.1421
				16	11.0726	5.8992	.2224	.1430
				17	10.6971	5.6991	.2133	.1381
				24	32.7024	17.4230	.7455	.4222
				25	38.9348	20.7434	.8962	.5027
67	5.61	.00	.00	2	67.2889	35.6613	1.5733	.8642
				3	40.2725	21.3434	.9234	.5172
				6	23.0090	12.1942	.5081	.2955
				13	3.2360	1.7150	.0325	.0416
				14	3.8379	2.0340	.0469	.0493
				15	3.5824	1.8986	.0408	.0460
				16	3.3182	1.7586	.0344	.0426
				17	3.1712	1.6807	.0309	.0407
				24	43.4859	23.0464	1.0007	.5585
				25	45.1390	23.9225	1.0405	.5797
				26	3.9247	2.0800	.0490	.0504

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TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{Pm}{P\infty}$	c_p	$\frac{Pm}{Po'}$	$\bar{\chi}$
37	15.14	.00	.00	1	.0069	4.5710	.0223	.0153	25.38
				2	.0044	2.8854	.0118	.0097	18.68
				4	.0041	2.7369	.0108	.0092	13.50
				5	.0038	2.4978	.0093	.0084	12.12
				6	.0035	2.3102	.0082	.0077	11.10
				7	.0084	5.5562	.0284	.0186	10.31
				8	.0134	8.8683	.0491	.0297	9.81
				9	.0212	14.0221	.0812	.0469	9.37
				10	.0300	19.8550	.1176	.0665	8.99
				11	.0331	21.8446	.1300	.0731	8.75
				12	.0210	13.8869	.0804	.0465	9.37
				13	.0191	12.6398	.0726	.0423	9.37
				15	.0033	2.2023	.0075	.0074	12.12
38	15.12	.00	.00	1	.0065	4.3292	.0208	.0145	25.44
				2	.0049	3.2619	.0141	.0109	18.73
				7	.0175	11.6611	.0666	.0391	10.33
				8	.0240	15.9509	.0935	.0535	9.83
				9	.0929	61.8489	.3804	.2076	9.40
				12	.1097	73.0106	.4502	.2451	9.40
				13	.1109	73.8381	.4553	.2479	9.40
				14	.1083	72.1312	.4447	.2421	9.40
				15	.0094	6.2363	.0327	.0209	12.15
39	15.15	.00	.00	1	.0063	4.2343	.0201	.0142	25.47
				2	.0049	3.3029	.0143	.0110	18.75
				4	.0139	9.4126	.0524	.0315	13.55
				5	.0156	10.5370	.0594	.0352	12.17
				6	.0146	9.8698	.0552	.0330	11.14
				7	.0172	11.6518	.0663	.0390	10.35
				8	.0233	15.7698	.0919	.0527	9.85
				9	.1015	68.7035	.4214	.2297	9.41
				10	.3085	208.8933	1.2940	.6983	9.03
				11	.2830	191.5744	1.1862	.6404	8.79
				12	.1087	73.6023	.4519	.2460	9.41
				13	.1034	70.0194	.4296	.2341	9.41
				14	.1555	105.3062	.6492	.3520	9.41
				15	.0084	5.7200	.0294	.0191	12.17
40	15.15	.00	.00	1	.0060	4.1827	.0198	.0140	25.64
				2	.0049	3.4300	.0151	.0115	18.88

TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{Pm}{P_\infty}$	c_p	$\frac{Pm}{Po'}$	$\bar{X}$
40	15.15	.00	.00	3	.0044	3.0248	.0126	.0101	15.63
				4	.0040	2.8094	.0113	.0094	13.63
				5	.0037	2.5589	.0097	.0086	12.25
				6	.0035	2.4172	.0088	.0081	11.21
				7	.0032	2.2349	.0077	.0075	10.42
				8	.0032	2.2457	.0078	.0075	9.91
				9	.0035	2.4014	.0087	.0080	9.47
				10	.0036	2.5139	.0094	.0084	9.09
				13	.0045	3.0961	.0130	.0103	9.47
				15	.0020	1.4118	.0026	.0047	12.25
41	15.14	.00	.00	1	.0064	4.2825	.0205	.0143	25.48
				2	.0231	15.5645	.0908	.0521	18.76
				3	.0268	18.0704	.1064	.0605	15.53
				4	.0254	17.0986	.1004	.0573	13.55
				5	.0203	13.6842	.0791	.0458	12.17
				6	.0262	17.6176	.1036	.0590	11.14
				7	.0182	12.2732	.0703	.0411	10.35
				9	.1251	84.2494	.5191	.2821	9.41
				10	.5338	359.6206	2.2360	1.2041	9.03
				11	.1915	128.9947	.7980	.4319	8.79
				13	.4153	279.7693	1.7381	.9368	9.41
				15	.0086	5.7813	.0298	.0194	12.17
42	15.23	.00	.00	2	.0305	21.6198	.1270	.0715	18.74
				3	.0313	22.1643	.1304	.0733	15.52
				4	.0308	21.8369	.1283	.0723	13.53
				5	.0272	19.2694	.1125	.0638	12.16
				6	.0260	18.4363	.1074	.0610	11.13
				7	.0218	15.4199	.0888	.0510	10.34
				9	.0634	44.8737	.2702	.1485	9.40
				11	.4146	293.5581	1.8019	.9715	8.78
				15	.0111	7.8445	.0422	.0260	12.16
43	15.15	-15.00	.00	1	.0463	32.0389	.1932	.1071	25.67
				2	.0429	29.6493	.1783	.0991	18.90
				3	.0436	30.1727	.1816	.1009	15.65
				4	.0435	30.0988	.1811	.1006	13.65
				5	.0426	29.4659	.1772	.0985	12.26
				6	.0421	29.0960	.1749	.0973	11.23
				9	.0399	27.5738	.1654	.0922	9.48

TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	P_m	$\frac{P_m}{P_\infty}$	c_p	$\frac{P_m}{P_o'}$	$\bar{X}$
43	15.15-	15.00	.00	10	.0397	27.4227	.1644	.0917	9.10
				11	.0382	26.4352	.1583	.0884	8.85
				13	.0352	24.3318	.1452	.0813	9.48
				15	.0179	12.3823	.0708	.0414	12.26
44	15.11-	15.00	.00	1	.0470	32.7699	.1988	.1101	568.67
				2	.0461	32.1624	.1950	.1081	834.79
				4	.0463	32.2935	.1958	.1085	492.78
				5	.0459	31.9726	.1938	.1074	137.95
				7	.0416	29.0145	.1753	.0975	668.71
				8	.0405	28.2388	.1704	.0949	539.12
				9	.0430	30.0022	.1815	.1008	426.74
				10	.0423	29.5043	.1784	.0991	328.07
				11	.0417	29.0479	.1755	.0976	265.84
				13	.0360	25.1124	.1509	.0844	426.74
45	15.15-	15.00	.00	1	.0466	31.5498	.1901	.1054	25.48
				2	.0448	30.3583	.1827	.1015	18.76
				3	.0447	30.3156	.1824	.1013	15.53
				4	.0457	30.9750	.1865	.1035	13.55
				5	.0444	30.0501	.1808	.1004	12.17
				6	.0681	46.1711	.2811	.1543	11.14
				7	.1116	75.6198	.4644	.2527	10.35
				9	.2225	150.7402	.9318	.5038	9.41
				10	.2349	159.1283	.9840	.5318	9.03
				11	.1860	126.0058	.7779	.4211	8.79
				13	.2254	152.7180	.9441	.5104	9.41
				14	.2086	141.3587	.8734	.4724	9.41
				15	.0394	26.6941	.1599	.0892	12.17
46	15.13-	15.00	.00	1	.0454	33.6305	.2037	.1128	26.32
				2	.0439	32.5676	.1971	.1092	19.38
				3	.0436	32.3044	.1954	.1083	16.05
				4	.0438	32.4943	.1966	.1090	14.00
				5	.0430	31.8876	.1928	.1069	12.58
				6	.0662	49.0664	.3001	.1645	11.51
				7	.1072	79.4780	.4899	.2665	10.69
				8	.1742	129.1205	.7999	.4330	10.17
				9	.2223	164.7709	1.0224	.5525	9.72
				10	.2227	165.0723	1.0243	.5536	9.33
				11	.1798	133.2192	.8254	.4467	9.08

TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	p_m	$\frac{p_m}{p_\infty}$	c_p	$\frac{p_m}{p_o'}$	$\bar{x}$
46	15.13	-15.00	.00	13	.2118	156.9384	.9735	.5263	9.72
				14	.1996	147.9022	.9171	.4960	9.72
				15	.0382	28.3269	.1706	.0950	12.58
47	15.15	-15.00	.00	1	.0441	31.3861	.1891	.1049	25.90
				2	.0421	29.9767	.1803	.1002	19.06
				3	.0444	31.6298	.1906	.1057	15.79
				4	.0856	60.9018	.3727	.2036	13.77
				5	.0893	63.5562	.3893	.2124	12.37
				6	.0861	61.2712	.3750	.2048	11.33
				7	.1091	77.6447	.4769	.2595	10.52
				8	.4211	299.7441	1.8589	1.0018	10.01
				9	.7743	551.0818	3.4229	1.8419	9.57
				10	.1491	106.0921	.6539	.3546	9.18
				11	.1268	90.2326	.5552	.3015	8.93
				13	.4362	310.4905	1.9258	1.0377	9.57
				14	.1670	118.8494	.7333	.3972	9.57
				15	.0839	59.6930	.3652	.1995	12.37
48	15.07	-15.00	.00	1	.0455	33.0664	.2018	.1117	26.42
				2	.0438	31.8832	.1944	.1078	19.45
				3	.0442	32.1524	.1961	.1087	16.11
				4	.0865	62.9232	.3897	.2127	14.05
				5	.0899	65.4002	.4053	.2210	12.62
				6	.0834	60.6739	.3755	.2051	11.56
				7	.1026	74.5992	.4632	.2521	10.73
				8	.4100	298.2321	1.8706	1.0079	10.21
				9	.8599	625.4951	3.9301	2.1139	9.76
				10	.1387	100.8611	.6285	.3409	9.36
				11	.1302	94.7200	.5898	.3201	9.11
				13	.2749	199.9351	1.2520	.6757	9.76
				14	.1304	94.8471	.5906	.3205	9.76
				15	.0803	58.4200	.3614	.1974	12.62
49	15.15	-15.00	.00	1	.0529	37.4271	.2267	.1251	25.90
				2	.1085	76.7633	.4715	.2566	19.06
				3	.1153	81.6293	.5018	.2728	15.79
				4	.1055	74.6362	.4583	.2495	13.77
				5	.0760	53.7798	.3285	.1798	12.37
				6	.0836	59.1877	.3621	.1978	11.33
				7	.0637	45.0981	.2744	.1507	10.52

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TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{Pm}{P_\infty}$	c_p	$\frac{Pm}{Po'}$	$\bar{x}$
49	15.15-	15.00	.00	8	.2194	155.2546	.9600	.5189	10.01
				9	.8351	591.0808	3.6722	1.9757	9.57
				11	.3174	224.6208	1.3916	.7508	8.93
				13	.6849	484.7582	3.0105	1.6203	9.57
				14	.3752	265.5482	1.6463	.8876	9.57
				15	.0716	50.6506	.3090	.1693	12.37
50	15.12-	15.00	.00	1	.0517	36.8897	.2244	.1239	26.10
				2	.1071	76.4043	.4714	.2565	19.21
				3	.1095	78.0901	.4820	.2622	15.91
				4	.1017	72.5723	.4475	.2437	13.88
				5	.0792	56.4922	.3469	.1897	12.47
				6	.0780	55.6260	.3415	.1868	11.42
				7	.0623	44.4457	.2716	.1492	10.60
				8	.2334	166.5257	1.0349	.5591	10.09
				9	.8452	602.9323	3.7633	2.0245	9.64
				10	.4002	285.5166	1.7788	.9587	9.25
				13	.7196	513.3293	3.2031	1.7236	9.64
				14	.4569	325.9284	2.0315	1.0944	9.64
				15	.0693	49.4708	.3030	.1661	12.47
51	15.15-	15.00	.00	1	.0965	70.0139	.4295	.2340	26.14
				2	.1227	88.9952	.5476	.2975	19.25
				3	.1269	92.0543	.5667	.3077	15.94
				4	.1245	90.2876	.5557	.3018	13.90
				5	.1031	74.7986	.4593	.2500	12.49
				6	.0985	71.4563	.4385	.2389	11.43
				7	.0752	54.5368	.3332	.1823	10.62
				8	.1176	85.3162	.5247	.2852	10.10
				9	.5701	413.5598	2.5675	1.3824	9.66
				10	.6700	486.0288	3.0185	1.6247	9.26
				11	.0742	53.8390	.3288	.1800	9.02
				13	.5512	399.8120	2.4819	1.3365	9.66
				14	.7605	551.6660	3.4269	1.8441	9.66
				15	.1056	76.6122	.4706	.2561	12.49
52	15.14-	15.00	.00	1	.0452	32.7186	.1978	.1096	26.17
				2	.0429	31.0656	.1875	.1040	19.27
				3	.0439	31.7638	.1918	.1064	15.96
				4	.0447	32.3503	.1955	.1083	13.92
				5	.0444	32.0886	.1939	.1075	12.50

TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{Pm}{P_\infty}$	c_p	$\frac{Pm}{Po'}$	$\bar{X}$
52	15.14	-15.00	.00	6	.0420	30.4151	.1834	.1019	11.45
				7	.0102	7.3867	.0398	.0247	10.63
				8	.0060	4.3662	.0210	.0146	10.12
				9	.0051	3.6718	.0167	.0123	9.67
				10	.0039	2.8203	.0114	.0094	9.28
				11	.0017	1.2002	.0012	.0040	9.03
				13	.0039	2.7974	.0112	.0094	9.67
53	15.10	-15.00	.00	1	.0449	31.5697	.1915	.1062	26.09
				2	.0455	31.9784	.1940	.1076	19.21
				3	.0461	32.4010	.1967	.1090	15.90
				4	.0048	3.3962	.0150	.0114	13.87
				5	.0460	32.3062	.1961	.1087	12.46
				6	.0442	31.0885	.1885	.1046	11.41
				7	.0025	1.7567	.0047	.0059	10.60
				8	.0013	.9185	-.0005	.0031	10.08
				9	.0012	.8665	-.0008	.0029	9.64
				10	.0023	1.6225	.0039	.0055	9.24
				13	.0017	1.1811	.0011	.0040	9.64
54	15.10	15.00	.00	3	.0032	2.2162	.0076	.0075	15.89
				4	.0006	.3920	-.0038	.0013	13.86
				5	.0038	2.6586	.0104	.0089	12.45
				6	.0045	3.1306	.0133	.0105	11.40
				7	.0041	2.8879	.0118	.0097	10.59
				8	.0050	3.4748	.0155	.0117	10.07
				9	.0063	4.4327	.0215	.0149	9.63
				10	.0117	8.1992	.0451	.0276	9.23
				13	.0064	4.4582	.0217	.0150	9.63
55	15.10	15.00	.00	1	.0007	.4825	-.0032	.0016	25.94
				2	.0005	.3620	-.0040	.0012	19.09
				3	.0005	.3426	-.0041	.0012	15.81
				5	.0007	.4629	-.0034	.0016	12.39
				6	.0014	.9605	-.0002	.0032	11.34
				7	.0018	1.2506	.0016	.0042	10.53
				8	.0023	1.6270	.0039	.0055	10.02
				9	.0028	1.9768	.0061	.0066	9.58
				10	.0032	2.2519	.0078	.0076	9.19
				13	.0011	.7730	-.0014	.0026	9.58
56	15.10	15.00	.00	1	.0007	.4847	-.0032	.0016	26.23

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TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{P_m}{P_\infty}$	c_p	$\frac{P_m}{P_o'}$	$\bar{X}$
56	15.10	15.00	.00	2	.0005	.3758	-.0039	.0013	19.31
				3	.0005	.3296	-.0042	.0011	15.99
				4	.0006	.4042	-.0037	.0014	13.95
				5	.0005	.3482	-.0041	.0012	12.53
				6	.0008	.5527	-.0028	.0019	11.47
				7	.0012	.8552	-.0009	.0029	10.66
				8	.0013	.9564	-.0003	.0032	10.14
				9	.0014	1.0000	-.0000	.0034	9.69
				10	.0018	1.2544	.0016	.0042	9.30
				13	.0005	.3820	-.0039	.0013	9.69
57	15.07	15.00	.00	1	.0009	.6403	-.0023	.0022	26.59
				2	.0006	.4397	-.0035	.0015	19.58
				3	.0006	.4340	-.0036	.0015	16.21
				4	.0004	.2635	-.0046	.0009	14.14
				5	.0022	1.5966	.0038	.0054	12.70
				6	.0024	1.7974	.0050	.0061	11.63
				7	.0024	1.7831	.0049	.0060	10.80
				8	.0029	2.1179	.0070	.0072	10.28
				9	.0041	3.0093	.0126	.0102	9.82
				10	.0057	4.2219	.0203	.0143	9.42
				11	.0040	2.9617	.0123	.0100	9.17
				13	.0029	2.1572	.0073	.0073	9.82
58	15.08	15.00	.00	1	.0009	.6112	-.0024	.0021	26.15
				2	.0006	.4263	-.0036	.0014	19.24
				3	.0035	2.5116	.0095	.0085	15.94
				4	.0006	.4465	-.0035	.0015	13.90
				5	.0039	2.7550	.0110	.0093	12.49
				6	.0043	3.0499	.0129	.0103	11.43
				7	.0041	2.8843	.0118	.0097	10.62
				8	.0051	3.5791	.0162	.0121	10.11
				9	.0074	5.2007	.0264	.0175	9.66
				10	.0098	6.9432	.0373	.0234	9.26
				13	.0075	5.2871	.0269	.0178	9.66
69	6.38	.00	.00	1	1.1403	.6933	-.0108	.0131	.19
				2	1.2586	.7652	-.0082	.0145	.14
				3	1.2685	.7712	-.0080	.0146	.11
				4	1.2083	.7346	-.0093	.0139	.10
				5	1.3289	.8079	-.0067	.0153	.09

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TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{Pm}{P_\infty}$	c_p	$\frac{Pm}{Po'}$	$\bar{X}$
69	6.38	.00	.00	6	1.3006	.7907	-.0073	.0150	.08
				7	1.5111	.9187	-.0029	.0174	.07
				8	1.2894	.7839	-.0076	.0149	.07
				9	1.4569	.8858	-.0040	.0168	.07
				10	1.5176	.9226	-.0027	.0175	.06
				11	1.3728	.8346	-.0058	.0158	.06
				13	1.4709	.8943	-.0037	.0170	.07
				14	1.8924	1.1505	.0053	.0218	.07
				15	1.2312	.7486	-.0088	.0142	.09
7C	6.37	15.00	.00	9	.2026	.1222	-.0309	.0023	.07
				10	.3387	.2042	-.0280	.0039	.06
				11	.4364	.2631	-.0259	.0050	.06
71	6.38	-15.00	.00	1	11.3612	6.6659	.1989	.1264	.18
				2	11.7255	6.8797	.2064	.1305	.13
				3	12.1598	7.1345	.2153	.1353	.11
				4	12.7210	7.4637	.2269	.1416	.09
				5	12.1451	7.1258	.2150	.1352	.08
				6	12.0472	7.0684	.2130	.1341	.08
				7	12.5367	7.3556	.2231	.1395	.07
				11	11.7561	6.8976	.2070	.1308	.06
				13	9.2072	5.4021	.1545	.1025	.06
				14	8.4290	4.9455	.1385	.0938	.06
				15	10.0331	5.8867	.1715	.1117	.08
72	6.38	-15.00	.00	1	12.5641	7.2707	.2201	.1379	.18
				2	11.8413	6.8525	.2054	.1300	.13
				3	12.4655	7.2137	.2181	.1368	.11
				4	13.0808	7.5698	.2306	.1436	.09
				5	12.2410	7.0837	.2135	.1343	.08
				6	12.5988	7.2908	.2208	.1383	.08
				7	12.9803	7.5116	.2285	.1425	.07
				9	11.6669	6.7515	.2019	.1280	.06
				10	11.4735	6.6396	.1979	.1259	.06
				11	11.5756	6.6987	.2000	.1270	.06
				12	10.6114	6.1407	.1804	.1165	.06
				13	8.9649	5.1879	.1470	.0984	.06
				14	8.2673	4.7842	.1328	.0907	.06
				15	10.3594	5.9949	.1753	.1137	.08
73	6.37	-15.00	.00	1	11.5401	6.5193	.1943	.1240	.18

TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{P_m}{P_\infty}$	c_p	$\frac{P_m}{P_{o'}}$	$\bar{x}$
73	6.37-	15.00	.00	2	11.5868	6.5457	.1952	.1245	.13
				3	12.0548	6.8101	.2046	.1290	.11
				4	12.3125	6.9556	.2097	.1323	.09
				5	11.7605	6.6438	.1987	.1264	.08
				6	11.4838	6.4875	.1932	.1234	.08
				7	12.2908	6.9434	.2092	.1321	.07
				9	11.2466	6.3535	.1885	.1209	.06
				10	11.4077	6.4445	.1917	.1226	.06
				11	11.3007	6.3841	.1896	.1215	.06
				12	10.0378	5.6706	.1644	.1079	.06
				13	8.7840	4.9623	.1395	.0944	.06
				14	8.3121	4.6957	.1301	.0893	.06
				15	10.1571	5.7380	.1668	.1092	.08
74	6.38-	15.00	.00	1	11.4267	6.4290	.1905	.1219	.18
				2	11.9881	6.7449	.2016	.1279	.13
				3	12.4582	7.0093	.2109	.1329	.11
				4	12.7783	7.1895	.2172	.1364	.09
				5	11.8400	6.6615	.1987	.1263	.08
				6	11.8110	6.6452	.1981	.1260	.08
				7	42.0801	23.6755	.7958	.4490	.07
				9	42.1635	23.7224	.7975	.4499	.06
				10	39.5613	22.2584	.7461	.4222	.06
				11	40.6212	22.8547	.7670	.4335	.06
				12	37.7249	21.2252	.7098	.4026	.06
				13	36.9273	20.7764	.6941	.3941	.06
				14	35.0206	19.7037	.6564	.3737	.06
				15	10.3053	5.7981	.1684	.1100	.08
75	6.38-	15.00	.00	1	11.3179	6.7201	.2008	.1275	.18
				2	11.7327	6.9664	.2094	.1321	.13
				3	12.3866	7.3547	.2230	.1395	.11
				4	12.7909	7.5947	.2315	.1441	.09
				5	11.8120	7.0135	.2111	.1330	.08
				6	11.8301	7.0243	.2114	.1332	.08
				7	40.9519	24.3157	.8183	.4612	.07
				9	41.2797	24.5104	.8251	.4649	.06
				10	39.2840	23.3254	.7835	.4424	.06
				11	38.6352	22.9401	.7700	.4351	.06
				12	38.0144	22.5715	.7571	.4281	.06
				13	35.9286	21.3331	.7136	.4047	.06

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TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{Pm}{P_\infty}$	c_p	$\frac{Pm}{Po'}$	$\bar{X}$
75	6.38-	15.00	.00	14	34.0671	20.2278	.6748	.3837	.06
				15	10.1727	6.0402	.1769	.1146	.08
76	6.38-	15.00	.00	1	11.6129	6.7329	.2012	.1277	.18
				2	11.6766	6.7699	.2025	.1284	.13
				3	12.1256	7.0302	.2116	.1333	.11
				4	11.9227	6.9126	.2075	.1311	.09
				5	11.3691	6.5916	.1962	.1250	.08
				6	11.1548	6.4674	.1919	.1227	.08
				7	93.4245	54.1659	1.8659	1.0273	.07
				9	77.3354	44.8376	1.5385	.8504	.06
				10	36.1729	20.9724	.7010	.3978	.06
				11	23.0157	13.3441	.4332	.2531	.06
				12	72.2797	41.9064	1.4357	.7948	.06
				13	64.3108	37.2862	1.2735	.7072	.06
				14	57.0941	33.1021	1.1267	.6278	.06
77	6.38-	15.00	.00	1	11.0684	6.7568	.2020	.1282	.19
				2	11.4513	6.9906	.2102	.1326	.14
				3	11.8236	7.2179	.2182	.1369	.11
				6	44.8580	27.3842	.9260	.5194	.08
				7	32.9293	20.1022	.6704	.3813	.07
				9	154.5227	94.3304	3.2756	1.7891	.07
				10	76.5820	46.7506	1.6057	.8867	.06
				11	52.1688	31.8472	1.0826	.6040	.06
				12	148.6827	90.7653	3.1504	1.7215	.07
				13	119.0338	72.6659	2.5152	1.3782	.07
				14	73.5240	44.8837	1.5402	.8513	.07
78	6.37-	15.00	.00	1	11.8280	6.9451	.2093	.1321	.18
				2	12.1040	7.1072	.2150	.1352	.13
				5	44.0952	25.8916	.8763	.4926	.09
				6	51.6966	30.3550	1.0335	.5775	.08
				7	28.4094	16.6813	.5521	.3174	.07
				9	89.9612	52.8230	1.8245	1.0049	.06
				10	125.4763	73.6767	2.5587	1.4017	.06
				11	104.3500	61.2718	2.1220	1.1657	.06
				12	89.0610	52.2944	1.8059	.9949	.06
				13	95.0162	55.7912	1.9290	1.0614	.06
				14	118.3173	69.4730	2.410	1.3217	.06
				15	46.5644	27.3415	.9274	.5202	.09

TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{Pm}{P_\infty}$	c_p	$\frac{Pm}{Po'}$	$\overline{X}$
79	6.38	-15.00	.00	1	13.9390	8.1840	.2521	.1552	.18
				2	12.0588	7.0801	.2134	.1343	.13
				3	20.7274	12.1696	.3920	.2308	.11
				4	29.0377	17.0488	.5633	.3233	.10
				5	33.3284	19.5680	.6517	.3711	.09
				6	45.3433	26.6223	.8992	.5049	.08
				8	44.0692	25.8743	.8730	.4907	.07
				9	194.8515	114.4025	3.9800	2.1697	.06
				10	99.1862	58.2350	2.0087	1.1045	.06
				11	78.0165	45.8057	1.5725	.8687	.06
				13	152.6964	89.6524	3.1114	1.7003	.06
				14	90.5385	53.1576	1.8305	1.0082	.06
				15	33.5846	19.7185	.6569	.3740	.09
80	6.38	-15.00	.00	1	11.7455	6.9364	.2083	.1316	.18
				2	12.0588	7.1215	.2148	.1351	.13
				3	12.4953	7.3792	.2239	.1400	.11
				4	13.0207	7.6895	.2348	.1458	.10
				5	12.0634	7.1242	.2149	.1351	.09
				6	12.0770	7.1322	.2152	.1353	.08
				7	1.5520	.9166	-.0029	.0174	.07
				8	1.0532	.6220	-.0133	.0118	.07
				10	.9538	.5633	-.0153	.0107	.06
				11	.8854	.5229	-.0167	.0099	.06
				13	.8783	.5187	-.0169	.0098	.06
				14	1.1341	.6697	-.0116	.0127	.06
				15	10.5187	6.2119	.1829	.1178	.08
81	6.38	-15.00	.00	1	11.7343	6.7831	.2030	.1286	.18
				2	12.4016	7.1688	.2165	.1360	.13
				3	12.7893	7.3930	.2244	.1402	.11
				4	12.9405	7.4804	.2274	.1419	.09
				5	12.3099	7.1159	.2146	.1350	.08
				6	12.2492	7.0808	.2134	.1343	.08
				15	11.0192	6.3697	.1885	.1208	.08
82	6.38	.00	.00	1	1.3924	.8055	-.0068	.0153	.18
				2	1.3044	.7546	-.0086	.0143	.13
				3	1.3733	.7945	-.0072	.0151	.11
				4	1.3933	.8061	-.0068	.0153	.09
				5	1.3596	.7866	-.0075	.0149	.08

TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{Pm}{P_\infty}$	c_p	$\frac{Pm}{P_{o'}}$	$\bar{\chi}$
82	6.38	.00	.00	6	1.5138	.8758	-.0044	.0166	.08
				7	8.4143	4.8680	.1358	.0923	.07
				8	10.1302	5.8607	.1706	.1112	.07
				9	10.6826	6.1803	.1818	.1172	.06
				10	10.6535	6.1634	.1812	.1169	.06
				11	11.7084	6.7737	.2026	.1285	.06
				13	11.2808	6.5263	.1940	.1238	.06
				14	10.5290	6.0914	.1787	.1155	.06
				15	1.3449	.7781	-.0078	.0148	.08
83	6.38	.00	.00	1	1.4044	.8154	-.0065	.0155	.18
				2	1.4476	.8404	-.0056	.0159	.13
				3	1.4507	.8422	-.0055	.0160	.11
				4	1.4325	.8317	-.0059	.0158	.09
				5	1.4109	.8191	-.0063	.0155	.08
				6	1.6160	.9382	-.0022	.0178	.08
				7	8.2725	4.8028	.1335	.0911	.07
				8	10.6087	6.1591	.1811	.1168	.07
				10	10.6587	6.1882	.1821	.1174	.06
				11	11.3189	6.5715	.1955	.1246	.06
				12	11.6990	6.7922	.2033	.1288	.06
				13	10.9616	6.3640	.1883	.1207	.06
				14	10.4197	6.0494	.1772	.1147	.06
				15	1.4343	.8327	-.0059	.0158	.08
84	6.38	.00	.00	1	1.2324	.7218	-.0098	.0137	.18
				2	1.4052	.8230	-.0062	.0156	.13
				3	1.5040	.8808	-.0042	.0167	.11
				4	1.4603	.8552	-.0051	.0162	.10
				5	1.5832	.9272	-.0026	.0176	.08
				6	3.7366	2.1884	.0417	.0415	.08
				7	15.6415	9.1608	.2864	.1737	.07
				8	28.2981	16.5734	.5466	.3143	.07
				10	32.0604	18.7769	.6239	.3561	.06
				11	33.9297	19.8717	.6623	.3769	.06
				13	30.1718	17.6708	.5851	.3351	.06
				14	27.2908	15.9835	.5259	.3031	.06
				15	1.4387	.8426	-.0055	.0160	.08
85	6.37	.00	.00	1	1.6035	.9409	-.0021	.0179	.18
				2	1.8942	1.1115	.0039	.0211	.13

TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{P_m}{P_\infty}$	c_p	$\frac{P_m}{P_{o'}}$	$\bar{X}$
85	6.37	.00	.00	4	5.2462	3.0786	.0732	.0586	.10
				5	4.1216	2.4186	.0499	.0460	.09
				6	10.6278	6.2366	.1844	.1186	.08
				10	41.5727	24.3957	.8237	.4641	.06
				11	47.8782	28.0958	.9540	.5345	.06
				15	6.0000	3.5209	.0888	.0670	.09
86	6.37	15.00	.00	1	1.2301	.7234	-.0097	.0138	.19
				3	1.0495	.6172	-.0135	.0117	.11
				4	1.1432	.6723	-.0115	.0128	.10
				5	1.1088	.6521	-.0122	.0124	.09
				6	1.3806	.8120	-.0066	.0154	.08
				10	4.9394	2.9050	.0671	.0553	.06
				11	8.1528	4.7949	.1336	.0912	.06
				13	3.5010	2.0591	.0373	.0392	.07
				14	10.2515	6.0292	.1771	.1147	.07
				15	.8494	.4995	-.0176	.0095	.09
87	6.37	15.00	.00	10	3.2746	1.8903	.0313	.0360	.06
				11	4.1086	2.3717	.0483	.0451	.06
				13	3.6854	2.1274	.0397	.0405	.07
				14	1.1510	.6644	-.0118	.0126	.07
88	6.37	15.00	.00	10	1.4160	.8103	-.0067	.0154	.06
				11	1.8323	1.0486	.0017	.0199	.06
				12	1.5118	.8652	-.0047	.0165	.06
				13	.5066	.2899	-.0250	.0055	.06
				14	.3746	.2144	-.0277	.0041	.06
89	6.37	.00	.00	4	7.8901	4.5971	.1266	.0875	.10
				5	8.0045	4.6638	.1290	.0887	.09
				6	9.7063	5.6553	.1639	.1076	.08
				10	31.6670	18.4505	.6144	.3510	.06
				12	66.1524	38.5431	1.3218	.7332	.06
				13	23.5806	13.7391	.4485	.2614	.06
				14	31.5673	18.3924	.6123	.3499	.06
				15	8.2111	4.7841	.1332	.0910	.09
90	5.93-	15.00	.00	1	6.3427	3.6308	.1069	.0791	.28
				2	7.3664	4.2168	.1307	.0919	.21
				3	7.2226	4.1345	.1273	.0901	.17

TABLE II c

PRESSURE DATA - FLAT PLATE MODEL

Run	M_∞	α	ψ	Press. No.	Pm	$\frac{Pm}{P_\infty}$	c_p	$\frac{Pm}{Po'}$	$\bar{X}$
90	5.93	-15.00	.00	4	7.6383	4.3725	.1370	.0953	.15
				5	7.7021	4.4090	.1385	.0961	.13
				6	8.0765	4.6233	.1472	.1007	.12
				7	4.5333	2.5951	.0648	.0565	.11
				10	6.2349	3.5691	.1044	.0778	.10
				11	6.5986	3.7773	.1128	.0823	.09
				13	5.1659	2.9572	.0795	.0644	.10
				14	5.0877	2.9124	.0777	.0635	.10
				15	6.2330	3.5680	.1043	.0777	.13

TABLE IIIa

HEAT TRANSFER DATA - LEADING EDGE MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\dfrac{\dot{q}_{av}}{\dot{q}_o}$	$\dfrac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\dot{q}_o$	$\dot{q}_{ref}$
1	1	6.38	.00	128.06	1.337	71.130	95.75	1.80
1	3	6.38	.00	127.13	1.328	70.614	95.75	1.80
1	5	6.38	.00	125.47	1.31[illegible]	69.692	95.75	1.80
1	7	6.38	.00	136.23	1.423	75.668	95.75	1.80
1	8	6.38	.00	120.98	1.264	67.198	95.75	1.80
1	9	6.38	.00	150.80	1.575	83.761	95.75	1.80
1	11	6.38	.00	45.68	.477	25.373	95.75	1.80
1	12	6.38	.00	13.51	.141	7.504	95.75	1.80
1	13	6.38	.00	12.06	.126	6.699	95.75	1.80
1	14	6.38	.00	13.08	.137	7.265	95.75	1.80
1	15	6.38	.00	20.37	.213	11.314	95.75	1.80
1	16	6.38	.00	15.51	.162	8.615	95.75	1.80
1	17	6.38	.00	10.88	.114	6.043	95.75	1.80
1	19	6.38	.00	22.61	.236	12.559	95.75	1.80
1	20	6.38	.00	95.20	.994	52.890	95.75	1.80
1	21	6.38	.00	111.12	1.161	61.721	95.75	1.80
1	23	6.38	.00	126.52	1.321	70.275	95.75	1.80
1	31	6.38	.00	10.64	.111	5.910	95.75	1.80
1	33	6.38	.00	9.26	.097	5.143	95.75	1.80
2	1	6.38	.00	121.58	1.267	66.135	95.94	1.84
2	3	6.38	.00	123.63	1.289	67.250	95.94	1.84
2	5	6.38	.00	114.34	1.192	62.197	95.94	1.84
2	7	6.38	.00	135.68	1.414	73.805	95.94	1.84
2	8	6.38	.00	117.56	1.225	63.948	95.94	1.84
2	9	6.38	.00	149.75	1.561	81.458	95.94	1.84
2	11	6.38	.00	45.29	.472	24.636	95.94	1.64
2	12	6.38	.00	12.42	.130	6.756	95.94	1.84
2	13	6.38	.00	11.71	.122	6.370	95.94	1.84
2	14	6.38	.00	12.76	.133	6.941	95.94	1.84
2	15	6.38	.00	19.66	.205	10.694	95.94	1.84
2	16	6.38	.00	14.69	.153	7.991	95.94	1.84
2	17	6.38	.00	13.96	.146	7.594	95.94	1.84
2	19	6.38	.00	21.29	.222	11.581	95.94	1.84
2	20	6.38	.00	90.43	.943	49.191	95.94	1.84
2	21	6.38	.00	88.92	.927	48.369	95.94	1.84
2	23	6.38	.00	103.83	1.082	56.480	95.94	1.84
2	31	6.38	.00	12.93	.135	7.033	95.94	1.84
2	33	6.38	.00	11.99	.125	6.522	95.94	1.84
4	1	6.18	.00	236.00	1.403	79.784	168.25	2.96
4	3	6.18	.00	215.31	1.280	72.789	168.25	2.96
4	5	6.18	.00	200.00	1.189	67.613	168.25	2.96
4	7	6.18	.00	209.15	1.243	70.707	168.25	2.96
4	8	6.18	.00	208.52	1.239	70.494	168.25	2.96
4	9	6.18	.00	199.40	1.185	67.410	168.25	2.96
4	11	6.18	.00	66.86	.397	22.603	168.25	2.96
4	12	6.18	.00	20.39	.121	6.893	168.25	2.96
4	13	6.18	.00	21.15	.126	7.150	168.25	2.96
4	14	6.18	.00	19.74	.117	6.673	168.25	2.96
4	15	6.18	.00	45.64	.271	15.429	168.25	2.96
4	16	6.18	.00	25.53	.152	8.631	168.25	2.96
4	17	6.18	.00	23.88	.142	8.073	168.25	2.96
4	19	6.18	.00	30.35	.180	10.260	168.25	2.96
4	20	6.18	.00	207.79	1.235	70.247	168.25	2.96
4	21	6.18	.00	161.60	.961	54.632	168.25	2.96
4	23	6.18	.00	157.39	.936	53.208	168.25	2.96
4	31	6.18	.00	22.29	.133	7.536	168.25	2.96
4	33	6.18	.00	21.40	.127	7.235	168.25	2.96
5	1	6.18	.00	234.85	1.413	79.518	166.25	2.95

TABLE IIIa

HEAT TRANSFER DATA - LEADING EDGE MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\dot{q}_o$	$\dot{q}_{ref}$
1	1	6.38	.00	128.06	1.337	71.130	95.75	1.80
1	3	6.38	.00	127.13	1.328	70.614	95.75	1.80
1	5	6.38	.00	125.47	1.31[illegible]	69.692	95.75	1.80
1	7	6.38	.00	136.23	1.423	75.668	95.75	1.80
1	8	6.38	.00	120.98	1.264	67.198	95.75	1.80
1	9	6.38	.00	150.80	1.575	83.761	95.75	1.80
1	11	6.38	.00	45.68	.477	25.373	95.75	1.80
1	12	6.38	.00	13.51	.141	7.504	95.75	1.80
1	13	6.38	.00	12.06	.126	6.699	95.75	1.80
1	14	6.38	.00	13.08	.137	7.265	95.75	1.80
1	15	6.38	.00	20.37	.213	11.314	95.75	1.80
1	16	6.38	.00	15.51	.162	8.615	95.75	1.80
1	17	6.38	.00	10.88	.114	6.043	95.75	1.80
1	19	6.38	.00	22.61	.236	12.559	95.75	1.80
1	20	6.38	.00	95.20	.994	52.890	95.75	1.80
1	21	6.38	.00	111.12	1.161	61.721	95.75	1.80
1	23	6.38	.00	126.52	1.321	70.275	95.75	1.80
1	31	6.38	.00	10.64	.111	5.910	95.75	1.80
1	33	6.38	.00	9.26	.097	5.143	95.75	1.80
2	1	6.38	.00	121.58	1.267	66.135	95.94	1.84
2	3	6.38	.00	123.63	1.289	67.250	95.94	1.84
2	5	6.38	.00	114.34	1.192	62.197	95.94	1.84
2	7	6.38	.00	135.68	1.414	73.805	95.94	1.84
2	8	6.38	.00	117.56	1.225	63.948	95.94	1.84
2	9	6.38	.00	149.75	1.561	81.458	95.94	1.84
2	11	6.38	.00	45.29	.472	24.636	95.94	1.84
2	12	6.38	.00	12.42	.130	6.756	95.94	1.84
2	13	6.38	.00	11.71	.122	6.370	95.94	1.84
2	14	6.38	.00	12.76	.133	6.941	95.94	1.84
2	15	6.38	.00	19.66	.205	10.694	95.94	1.84
2	16	6.38	.00	14.69	.153	7.991	95.94	1.84
2	17	6.38	.00	13.96	.146	7.594	95.94	1.84
2	19	6.38	.00	21.29	.222	11.581	95.94	1.84
2	20	6.38	.00	90.43	.943	49.191	95.94	1.84
2	21	6.38	.00	88.92	.927	48.369	95.94	1.84
2	23	6.38	.00	103.83	1.082	56.480	95.94	1.84
2	31	6.38	.00	12.93	.135	7.033	95.94	1.84
2	33	6.38	.00	11.99	.125	6.522	95.94	1.84
4	1	6.18	.00	236.00	1.403	79.784	168.25	2.96
4	3	6.18	.00	215.31	1.280	72.789	168.25	2.96
4	5	6.18	.00	200.00	1.189	67.613	168.25	2.96
4	7	6.18	.00	209.15	1.243	70.707	168.25	2.96
4	8	6.18	.00	208.52	1.239	70.494	168.25	2.96
4	9	6.18	.00	199.40	1.185	67.410	168.25	2.96
4	11	6.18	.00	66.86	.397	22.603	168.25	2.96
4	12	6.18	.00	20.39	.121	6.893	168.25	2.96
4	13	6.18	.00	21.15	.126	7.150	168.25	2.96
4	14	6.18	.00	19.74	.117	6.673	168.25	2.96
4	15	6.18	.00	45.64	.271	15.429	168.25	2.96
4	16	6.18	.00	25.53	.152	8.631	168.25	2.96
4	17	6.18	.00	23.88	.142	8.073	168.25	2.96
4	19	6.18	.00	30.35	.180	10.260	168.25	2.96
4	20	6.18	.00	207.79	1.235	70.247	168.25	2.96
4	21	6.18	.00	161.60	.961	54.632	168.25	2.96
4	23	6.18	.00	157.39	.936	53.208	168.25	2.96
4	31	6.18	.00	22.29	.133	7.536	168.25	2.96
4	33	6.18	.00	21.40	.127	7.235	168.25	2.96
5	1	6.18	.00	234.85	1.413	79.518	166.25	2.95

TABLE IIIa

HEAT TRANSFER DATA - LEADING EDGE MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\dot{q}_{av}/\dot{q}_o$	$\dot{q}_{av}/\dot{q}_{ref}$	$\dot{q}_o$	$\dot{q}_{ref}$
5	2	6.18	.00	211.71	1.273	71.683	166.25	2.95
5	3	6.18	.00	208.83	1.256	70.708	166.25	2.95
5	4	6.18	.00	209.07	1.258	70.789	166.25	2.95
5	5	6.18	.00	191.81	1.154	64.945	166.25	2.95
5	6	6.18	.00	208.03	1.251	70.437	166.25	2.95
5	7	6.18	.00	223.29	1.343	75.604	166.25	2.95
5	8	6.18	.00	193.30	1.163	65.449	166.25	2.95
5	9	6.18	.00	196.70	1.183	66.601	166.25	2.95
5	10	6.18	.00	146.77	.883	49.695	166.25	2.95
5	11	6.18	.00	73.25	.441	24.802	166.25	2.95
5	12	6.18	.00	21.64	.130	7.327	166.25	2.95
5	13	6.18	.00	19.65	.118	6.653	166.25	2.95
5	31	6.18	.00	22.28	.134	7.544	166.25	2.95
5	32	6.18	.00	21.74	.131	7.361	166.25	2.95
5	33	6.18	.00	20.74	.125	7.022	166.25	2.95
5	34	6.18	.00	25.59	.154	8.665	166.25	2.95
5	35	6.18	.00	43.43	.261	14.705	166.25	2.95
5	36	6.18	.00	24.12	.145	8.167	166.25	2.95
6	8	6.18	.00	188.62	1.135	63.959	166.13	2.95
6	9	6.18	.00	196.55	1.183	66.648	166.13	2.95
6	15	6.18	.00	31.70	.191	10.749	166.13	2.95
6	17	6.18	.00	22.77	.137	7.721	166.13	2.95
6	18	6.18	.00	202.59	1.220	68.696	166.13	2.95
6	19	6.18	.00	28.41	.171	9.634	166.13	2.95
6	20	6.18	.00	150.31	.905	50.969	166.13	2.95
6	21	6.18	.00	146.63	.883	49.721	166.13	2.95
6	22	6.18	.00	139.51	.840	47.307	166.13	2.95
6	23	6.18	.00	156.06	.939	52.918	166.13	2.95
6	24	6.18	.00	121.39	.731	41.162	166.13	2.95
6	25	6.18	.00	22.42	.135	7.602	166.13	2.95
6	26	6.18	.00	23.10	.139	7.833	166.13	2.95
6	27	6.18	.00	21.95	.132	7.443	166.13	2.95
6	28	6.18	.00	23.17	.140	7.857	166.13	2.95
6	29	6.18	.00	23.99	.144	8.135	166.13	2.95
6	30	6.18	.00	24.28	.146	8.233	166.13	2.95
7	1	5.93	.00	360.58	1.418	86.476	254.35	4.17
7	3	5.93	.00	307.14	1.208	73.660	254.35	4.17
7	5	5.93	.00	282.92	1.112	67.852	254.35	4.17
7	7	5.93	.00	301.48	1.185	72.303	254.35	4.17
7	8	5.93	.00	285.56	1.123	68.485	254.35	4.17
7	9	5.93	.00	294.87	1.159	70.717	254.35	4.17
7	11	5.93	.00	111.40	.438	26.717	254.35	4.17
7	12	5.93	.00	30.94	.122	7.420	254.35	4.17
7	13	5.93	.00	28.02	.110	6.720	254.35	4.17
7	14	5.93	.00	30.04	.118	7.204	254.35	4.17
7	15	5.93	.00	47.21	.186	11.322	254.35	4.17
7	16	5.93	.00	36.05	.142	8.646	254.35	4.17
7	17	5.93	.00	34.32	.135	8.231	254.35	4.17
7	19	5.93	.00	31.27	.123	7.499	254.35	4.17
7	20	5.93	.00	229.15	.901	54.956	254.35	4.17
7	21	5.93	.00	219.40	.863	52.618	254.35	4.17
7	23	5.93	.00	226.22	.889	54.253	254.35	4.17
7	31	5.93	.00	33.91	.133	8.133	254.35	4.17
7	33	5.93	.00	31.49	.124	7.552	254.35	4.17
8	1	7.72	.00	122.18	1.921	32.583	63.62	.92
8	2	7.72	.00	81.65	1.284	88.602	63.62	.92
8	3	7.72	.00	83.15	1.307	90.230	63.62	.92
8	4	7.72	.00	98.76	1.552	7.169	63.62	.92

TABLE IIIa

HEAT TRANSFER DATA - LEADING EDGE MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\dot{q}_o$	$\dot{q}_{ref}$
8	5	7.72	.00	79.06	1.243	85.791	63.62	.92
8	6	7.72	.00	84.43	1.327	91.619	63.62	.92
8	7	7.72	.00	88.17	1.386	95.677	63.62	.92
8	8	7.72	.00	83.15	1.307	90.230	63.62	.92
8	9	7.72	.00	85.89	1.350	93.203	63.62	.92
8	10	7.72	.00	74.33	1.168	80.659	63.62	.92
8	11	7.72	.00	32.30	.508	35.050	63.62	.92
8	12	7.72	.00	7.88	.124	8.551	63.62	.92
8	13	7.72	.00	6.95	.109	7.542	63.62	.92
8	14	7.72	.00	7.81	.123	8.475	63.62	.92
8	15	7.72	.00	10.81	.170	11.730	63.62	.92
8	16	7.72	.00	10.26	.161	11.134	63.62	.92
8	32	7.72	.00	8.29	.130	8.996	63.62	.92
8	33	7.72	.00	7.98	.125	8.659	63.62	.92
9	1	6.82	.00	152.45	.712	51.118	214.08	2.98
9	3	6.82	.00	249.57	1.166	83.683	214.08	2.98
9	5	6.82	.00	241.60	1.129	81.011	214.08	2.98
9	7	6 32	.00	256.86	1.200	86.128	214.08	2.98
9	8	6.82	.00	242.37	1.132	81.269	214.08	2.98
9	9	6.82	.00	260.67	1.218	87.405	214.08	2.98
9	11	6.82	.00	89.13	.416	29.886	214.08	2.98
9	12	6.82	.00	23.02	.108	7.719	214.08	2.98
9	13	6.82	.00	16.41	.077	5.502	214.08	2.98
9	14	6.82	.00	20.34	.095	6.820	214.08	2.98
9	15	6.82	.00	19.56	.091	6.559	214.08	2.98
9	16	6.82	.00	21.08	.099	7.068	214.08	2.98
9	17	6.82	.00	18.04	.084	6.049	214.08	2.98
9	20	6.82	.00	299.29	1.398	.355	214.08	2.98
9	21	6.82	.00	202.41	.946	67.870	214.08	2.98
9	23	6.82	.00	181.43	.848	60.835	214.08	2.98
9	31	6.82	.00	20.18	.094	6.767	214.08	2.98
9	33	6.82	.00	24.88	.116	8.343	214.08	2.98
10	8	7.72	.00	87.62	1.353	92.523	64.76	.95
10	9	7.72	.00	90.14	1.392	95.184	64.76	.95
10	15	7.72	.00	10.81	.167	11.415	64.76	.95
10	17	7.72	.00	9.60	.148	10.137	64.76	.95
10	18	7.72	.00	166.52	2.572	75.839	64.76	.95
10	20	7.72	.00	84.03	1.298	88.733	64.76	.95
10	21	7.72	.00	78.32	1.209	82.703	64.76	.95
10	22	7.72	.00	73.33	1.132	77.434	64.76	.95
10	23	7.72	.00	64.89	1.002	68.521	64.76	.95
10	24	7.72	.00	65.15	1.006	68.796	64.76	.95
10	25	7.72	.00	15.58	.241	16.452	64.76	.95
10	26	7.72	.00	8.79	.136	9.282	64.76	.95
10	27	7.72	.00	7.33	.113	7.740	64.76	.95
10	28	7.72	.00	9.34	.144	9.863	64.76	.95
10	29	7.72	.00	8.77	.135	9.261	64.76	.95
10	30	7.72	.00	9.46	.146	9.989	64.76	.95
11	1	7.72	.00	88.74	1.398	96.612	63.50	.92
11	2	7.72	.00	70.84	1.116	77.124	63.50	.92
11	3	7.72	.00	77.53	1.221	84.408	63.50	.92
11	4	7.72	.00	86.50	1.362	94.173	63.50	.92
11	5	7.72	.00	70.22	1.106	76.449	63.50	.92
11	6	7.72	.00	74.03	1.166	80.597	63.50	.92
11	7	7.72	.00	72.83	1.147	79.291	63.50	.92
11	8	7.72	.00	71.87	1.132	78.246	63.50	.92
11	9	7.72	.00	80.64	1.270	87.794	63.50	.92
11	10	7.72	.00	66.22	1.043	72.094	63.50	.92

TABLE IIa

HEAT TRANSFER DATA - LEADING EDGE MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\dot{q}_o$	$\dot{q}_{ref}$
[illegible]	[illegible]	7.72	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.92
[illegible]	12	7.72	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.92
11	13	7.72	.00	5.98	.094	6.511	63.50	.92
11	31	7.72	.00	7.18	.113	7.817	63.50	.92
11	33	7.72	.00	6.81	.107	7.414	63.50	.92
11	34	7.72	.00	9.03	.142	9.831	63.50	.92
11	35	7.72	.00	11.37	.179	12.379	63.50	.92
11	36	7.72	.00	8.30	.131	9.036	63.50	.92
12	8	7.72	.00	75.11	1.149	79.120	65.35	.95
12	9	7.72	.00	76.46	1.170	80.542	65.35	.95
12	15	7.72	.00	8.76	.134	9.228	65.35	.95
12	17	7.72	.00	8.29	.127	8.733	65.35	.95
12	19	7.72	.00	10.02	.153	10.555	65.35	.95
12	20	7.72	.00	71.81	1.099	75.644	65.35	.95
12	21	7.72	.00	65.70	1.005	69.208	65.35	.95
12	22	7.72	.00	62.90	.963	66.258	65.35	.95
12	23	7.72	.00	54.30	.831	57.199	65.35	.95
12	24	7.72	.00	62.93	.963	66.290	65.35	.95
12	25	7.72	.00	10.61	.162	11.176	65.35	.95
12	26	7.72	.00	7.26	.111	7.648	65.35	.95
12	28	7.72	.00	8.21	.126	8.648	65.35	.95
12	29	7.72	.00	7.77	.119	8.185	65.35	.95
12	30	7.72	.00	8.13	.124	8.564	65.35	.95
13	8	6.17	.00	236.94	1.341	74.579	176.65	3.18
13	9	6.17	.00	248.78	1.408	78.305	176.65	3.18
13	15	6.17	.00	38.96	.221	12.263	176.65	3.18
13	17	6.17	.00	27.53	.156	8.665	176.65	3.18
13	18	6.17	.00	214.81	1.216	67.613	176.65	3.18
13	19	6.17	.00	51.69	.293	16.270	176.65	3.18
13	20	6.17	.00	200.16	1.133	63.002	176.65	3.18
13	21	6.17	.00	191.72	1.085	60.345	176.65	3.18
13	22	6.17	.00	182.51	1.033	57.446	176.65	3.18
13	23	6.17	.00	174.10	.986	54.799	176.65	3.18
13	24	6.17	.00	190.99	1.081	60.116	176.65	3.18
13	25	6.17	.00	35.82	.203	11.275	176.65	3.18
13	26	6.17	.00	26.82	.152	8.442	176.65	3.18
13	27	6.17	.00	25.36	.144	7.982	176.65	3.18
13	28	6.17	.00	25.75	.146	8.105	176.65	3.18
13	29	6.17	.00	25.02	.142	7.875	176.65	3.18
13	30	6.17	.00	27.75	.157	8.735	176.65	3.18
14	1	6.18	.00	333.83	1.964	10.875	170.02	3.01
14	3	6.18	.00	232.36	1.367	77.173	170.02	3.01
14	4	6.18	.00	273.87	1.611	90.960	170.02	3.01
14	5	6.18	.00	226.24	1.331	75.141	170.02	3.01
14	6	6.18	.00	243.62	1.433	80.913	170.02	3.01
14	7	6.18	.00	252.03	1.482	83.706	170.02	3.01
14	8	6.18	.00	231.47	1.361	76.878	170.02	3.01
14	9	6.18	.00	243.59	1.433	80.903	170.02	3.01
14	10	6.18	.00	195.55	1.150	64.948	170.02	3.01
14	11	6.18	.00	91.65	.539	30.440	170.02	3.01
14	12	6.18	.00	24.76	.146	8.224	170.02	3.01
14	13	6.18	.00	23.69	.139	7.868	170.02	3.01
14	14	6.18	.00	22.95	.135	7.622	170.02	3.01
14	15	6.18	.00	35.98	.212	11.950	170.02	3.01
14	16	6.18	.00	27.43	.161	9.116	170.02	3.01
14	18	6.18	.00	214.07	1.259	71.099	170.02	3.01
14	31	6.18	.00	22.24	.131	7.397	170.02	3.01
14	32	6.18	.00	25.17	.148	8.360	170.02	3.01

TABLE IIIa

HEAT TRANSFER DATA - LEADING EDGE MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\dot{q}_o$	$\dot{q}_{ref}$
14	33	6.18	.00	23.80	.140	7.905	170.02	3.01
15	1	7.71	.00	87.78	1.318	90.314	66.60	.97
15	3	7.71	.00	69.12	1.038	71.115	66.60	.97
15	5	7.71	.00	57.82	.868	59.489	66.60	.97
15	7	7.71	.00	63.65	.956	65.487	66.60	.97
15	8	7.71	.00	64.83	.973	66.701	66.60	.97
15	9	7.71	.00	63.72	.957	65.559	66.60	.97
15	11	7.71	.00	24.43	.367	25.135	66.60	.97
15	12	7.71	.00	6.33	.095	6.513	66.60	.97
15	13	7.71	.00	5.41	.081	5.566	66.60	.97
15	14	7.71	.00	6.16	.093	6.338	66.60	.97
15	15	7.71	.00	7.76	.117	7.984	66.60	.97
15	16	7.71	.00	7.72	.116	7.943	66.60	.97
15	17	7.71	.00	7.12	.107	7.326	66.60	.97
15	20	7.71	.00	53.27	.800	54.808	66.60	.97
15	21	7.71	.00	50.07	.752	51.515	66.60	.97
15	23	7.71	.00	44.87	.674	46.165	66.60	.97
15	33	7.71	.00	6.33	.095	6.513	66.60	.97
16	1	6.28	.00	318.22	2.387	30.440	133.29	2.44
16	3	6.28	.00	219.29	1.645	89.888	133.29	2.44
16	5	6.28	.00	211.17	1.584	86.560	133.29	2.44
16	7	6.28	.00	290.77	2.181	19.188	133.29	2.44
16	8	6.28	.00	225.91	1.695	92.602	133.29	2.44
16	9	6.28	.00	209.13	1.569	85.723	133.29	2.44
16	11	6.28	.00	82.95	.622	34.002	133.29	2.44
16	12	6.28	.00	22.49	.169	9.219	133.29	2.44
16	13	6.28	.00	20.66	.155	8.469	133.29	2.44
16	21	6.28	.00	188.55	1.415	77.288	133.29	2.44
16	23	6.28	.00	155.05	1.163	63.556	133.29	2.44
16	25	6.28	.00	41.62	.312	17.060	133.29	2.44
16	27	6.28	.00	22.50	.169	9.223	133.29	2.44
16	28	6.28	.00	23.73	.178	9.727	133.29	2.44
16	32	6.28	.00	35.10	.263	14.388	133.29	2.44
16	33	6.28	.00	20.68	.155	8.477	133.29	2.44
16	34	6.28	.00	25.34	.190	10.387	133.29	2.44
16	35	6.28	.00	36.64	.275	15.019	133.29	2.44
16	36	6.28	.00	22.85	.171	9.366	133.29	2.44
17	1	6.33	.00	246.10	2.173	18.068	113.27	2.08
17	3	6.33	.00	182.41	1.610	87.513	113.27	2.08
17	5	6.33	.00	176.76	1.561	84.802	113.27	2.08
17	7	6.33	.00	185.61	1.639	89.048	113.27	2.08
17	8	6.33	.00	188.33	1.663	90.353	113.27	2.08
17	9	6.33	.00	184.42	1.628	88.477	113.27	2.08
17	11	6.33	.00	68.95	.609	33.079	113.27	2.08
17	12	6.33	.00	18.21	.161	8.736	113.27	2.08
17	13	6.33	.00	17.26	.152	8.281	113.27	2.08
17	14	6.33	.00	18.45	.163	8.852	113.27	2.08
17	15	6.33	.00	27.88	.246	13.376	113.27	2.08
17	16	6.33	.00	22.40	.198	10.747	113.27	2.08
17	17	6.33	.00	20.17	.178	9.677	113.27	2.08
17	18	6.33	.00	198.81	1.755	95.381	113.27	2.08
17	20	6.33	.00	164.03	1.448	78.695	113.27	2.08
17	21	6.33	.00	140.08	1.237	67.205	113.27	2.08
17	23	6.33	.00	164.51	1.452	78.925	113.27	2.08
17	33	6.33	.00	17.51	.155	8.401	113.27	2.08
18	3	5.60	.00	590.22	1.841	7.781	320.58	5.48

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TABLE III a

HEAT TRANSFER DATA - LEADING EDGE MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\dot{q}_o$	$\dot{q}_{ref}$
18	6	5.60	.00	567.30	1.770	3.595	320.58	5.48
18	8	5.60	.00	542.67	1.693	99.097	320.58	5.48
18	9	5.60	.00	547.44	1.708	99.968	320.58	5.48
18	10	5.60	.00	473.72	1.478	86.506	320.58	5.48
18	11	5.60	.00	207.51	.647	37.894	320.58	5.48
18	12	5.60	.00	50.94	.159	9.302	320.58	5.48
18	13	5.60	.00	46.03	.144	8.406	320.58	5.48
18	14	5.60	.00	53.84	.168	9.832	320.58	5.48
18	15	5.60	.00	80.92	.252	14.777	320.58	5.48
18	16	5.60	.00	70.11	.219	12.803	320.58	5.48
18	17	5.60	.00	62.29	.194	11.375	320.58	5.48
18	18	5.60	.00	702.49	2.191	28.282	320.58	5.48
18	20	5.60	.00	542.07	1.691	98.988	320.58	5.48
18	21	5.60	.00	515.57	1.608	94.149	320.58	5.48
18	23	5.60	.00	414.41	1.293	75.676	320.58	5.48
18	33	5.60	.00	53.26	.166	9.726	320.58	5.48
30	1	15.17	.00	7.60	.480	46.633	15.82	.05
30	3	15.17	.00	5.94	.375	14.605	15.82	.05
30	5	15.17	.00	5.70	.360	9.975	15.82	.05
30	7	15.17	.00	5.42	.343	4.573	15.82	.05
30	8	15.17	.00	5.40	.341	4.187	15.82	.05
30	9	15.17	.00	5.26	.333	1.486	15.82	.05
30	10	15.17	.00	4.40	.278	84.893	15.82	.05
30	11	15.17	.00	2.13	.135	41.096	15.82	.05
30	12	15.17	.00	.72	.046	13.892	15.82	.05
30	13	15.17	.00	.68	.043	13.120	15.82	.05
30	14	15.17	.00	.75	.047	14.470	15.82	.05
30	15	15.17	.00	1.04	.066	20.066	15.82	.05
30	31	15.17	.00	.51	.032	9.840	15.82	.05
30	32	15.17	.00	.44	.028	8.489	15.82	.05
30	33	15.17	.00	.44	.028	8.489	15.82	.05
30	35	15.17	.00	.69	.044	13.313	15.82	.05
30	36	15.17	.00	.74	.047	14.277	15.82	.05
31	8	15.17	.00	5.37	.342	3.966	15.72	.05
31	9	15.17	.00	5.25	.334	1.643	15.72	.05
31	15	15.17	.00	.85	.054	16.456	15.72	.05
31	17	15.17	.00	.65	.041	12.584	15.72	.05
31	18	15.17	.00	5.13	.326	99.320	15.72	.05
31	19	15.17	.00	.92	.059	17.812	15.72	.05
31	20	15.17	.00	3.04	.193	58.856	15.72	.05
31	21	15.17	.00	4.17	.265	80.733	15.72	.05
31	22	15.17	.00	4.57	.291	88.478	15.72	.05
31	25	15.17	.00	.97	.062	18.780	15.72	.05
31	26	15.17	.00	.74	.047	14.327	15.72	.05
31	27	15.17	.00	.68	.043	13.165	15.72	.05
31	28	15.17	.00	.73	.046	14.133	15.72	.05
31	29	15.17	.00	.60	.038	11.616	15.72	.05
31	30	15.17	.00	.51	.032	9.874	15.72	.05
32	8	15.20	.00	5.71	.349	10.168	16.38	.05
32	9	15.20	.00	5.38	.328	3.801	16.38	.05
32	15	15.20	.00	.69	.042	13.313	16.38	.05
32	17	15.20	.00	.57	.035	10.998	16.38	.05
32	18	15.20	.00	5.50	.336	6.116	16.38	.05
32	19	15.20	.00	.99	.060	19.101	16.38	.05
32	20	15.20	.00	4.27	.261	82.385	16.38	.05
32	21	15.20	.00	4.41	.269	85.086	16.38	.05
32	22	15.20	.00	4.82	.294	92.996	16.38	.05
32	23	15.20	.00	5.49	.335	5.923	16.38	.05

TABLE III a

HEAT TRANSFER DATA - LEADING EDGE MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\dot{q}_o$	$\dot{q}_{ref}$
32	24	15.20	.00	3.39	.207	65.406	16.38	.05
32	25	15.20	.00	1.02	.062	19.680	16.38	.05
32	26	15.20	.00	.91	.056	17.557	16.38	.05
32	27	15.20	.00	.84	.051	16.207	16.38	.05
32	28	15.20	.00	.81	.049	15.628	16.38	.05
32	29	15.20	.00	.63	.039	12.155	16.38	.05
32	30	15.20	.00	.56	.034	10.805	16.38	.05
33	1	15.13	.00	5.48	.360	22.009	15.21	.04
33	3	15.13	.00	4.99	.328	11.100	15.21	.04
33	5	15.13	.00	4.74	.312	5.533	15.21	.04
33	7	15.13	.00	4.74	.312	5.533	15.21	.04
33	8	15.13	.00	4.84	.318	7.760	15.21	.04
33	9	15.13	.00	4.36	.287	97.073	15.21	.04
33	14	15.13	.00	.77	.051	17.144	15.21	.04
33	15	15.13	.00	.47	.031	10.464	15.21	.04
33	16	15.13	.00	.54	.036	12.023	15.21	.04
33	17	15.13	.00	.52	.034	11.578	15.21	.04
33	18	15.13	.00	4.42	.291	98.409	15.21	.04
33	21	15.13	.00	3.46	.228	77.035	15.21	.04
33	23	15.13	.00	4.00	.263	89.058	15.21	.04
33	25	15.13	.00	.94	.062	20.929	15.21	.04
33	27	15.13	.00	.66	.043	14.695	15.21	.04
33	28	15.13	.00	.68	.045	15.140	15.21	.04
33	31	15.13	.00	.52	.034	11.578	15.21	.04
33	33	15.13	.00	.40	.026	8.906	15.21	.04
34	1	15.17	.00	4.09	.258	78.912	15.85	.05
34	3	15.17	.00	3.90	.246	75.246	15.85	.05
34	5	15.17	.00	3.76	.237	72.545	15.85	.05
34	7	15.17	.00	3.70	.234	71.387	15.85	.05
34	8	15.17	.00	3.84	.242	74.088	15.85	.05
34	9	15.17	.00	3.75	.237	72.352	15.85	.05
34	10	15.17	.00	3.15	.199	60.776	15.85	.05
34	11	15.17	.00	1.52	.096	29.327	15.85	.05
34	12	15.17	.00	.59	.037	11.383	15.85	.05
34	13	15.17	.00	.56	.035	10.805	15.85	.05
34	14	15.17	.00	.72	.045	13.892	15.85	.05
34	15	15.17	.00	.43	.027	8.296	15.85	.05
34	16	15.17	.00	.48	.030	9.261	15.85	.05
34	31	15.17	.00	.51	.032	9.840	15.85	.05
34	32	15.17	.00	.37	.023	7.139	15.85	.05
34	33	15.17	.00	.29	.018	5.595	15.85	.05
34	34	15.17	.00	.64	.040	12.348	15.85	.05
34	35	15.17	.00	.50	.032	9.647	15.85	.05
34	36	15.17	.00	.51	.032	9.840	15.85	.05
35	8	15.18	.00	3.83	.241	73.895	15.86	.05
35	9	15.18	.00	3.65	.230	70.423	15.86	.05
35	15	15.18	.00	.40	.025	7.718	15.86	.05
35	17	15.18	.00	.46	.029	8.875	15.86	.05
35	18	15.18	.00	3.81	.240	73.510	15.86	.05
35	19	15.18	.00	.65	.041	12.541	15.86	.05
35	20	15.18	.00	1.88	.119	36.272	15.86	.05
35	21	15.18	.00	2.41	.152	46.498	15.86	.05
35	22	15.18	.00	2.82	.178	54.409	15.86	.05
35	23	15.18	.00	3.08	.194	59.425	15.86	.05
35	24	15.18	.00	2.22	.140	42.832	15.86	.05
35	25	15.18	.00	.74	.047	14.277	15.86	.05
35	26	15.18	.00	.53	.033	10.226	15.86	.05
35	27	15.18	.00	.48	.030	9.261	15.86	.05

TABLE III a

HEAT TRANSFER DATA - LEADING EDGE MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\dot{q}_o$	$\dot{q}_{ref}$
35	28	15.18	.00	.52	.033	10.033	15.86	.05
35	29	15.18	.00	.32	.020	6.174	15.86	.05
35	30	15.18	.00	.32	.020	6.174	15.86	.05

TABLE IIIb
HEAT TRANSFER DATA - HEMISPHERE-CYLINDER MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\dot{q}_{av}/\dot{q}_o$	$\dot{q}_{av}/\dot{q}_{ref}$	$\dot{q}_o$	$\dot{q}_{ref}$
19	1	13.48	.00	21.59	1.405	70.425	15.36	.06
19	2	13.48	.00	17.78	1.157	5.056	15.36	.06
19	3	13.48	.00	7.11	.463	21.988	15.36	.06
19	6	13.48	.00	3.53	.230	60.565	15.36	.06
19	7	13.48	.00	1.75	.114	30.025	15.36	.06
19	8	13.48	.00	1.37	.089	23.505	15.36	.06
19	9	13.48	.00	1.17	.076	20.074	15.36	.06
19	10	13.48	.00	1.16	.076	19.902	15.36	.06
19	13	13.48	.00	1.20	.078	20.589	15.36	.06
19	14	13.48	.00	.96	.063	16.471	15.36	.06
19	15	13.48	.00	1.31	.085	22.476	15.36	.06
19	16	13.48	.00	1.33	.087	22.819	15.36	.06
19	17	13.48	.00	1.20	.078	20.589	15.36	.06
19	19	13.48	.00	20.44	1.331	50.694	15.36	.06
19	20	13.48	.00	17.31	1.127	96.992	15.36	.06
19	21	13.48	.00	10.71	.697	83.754	15.36	.06
19	22	13.48	.00	22.07	1.437	78.661	15.36	.06
19	23	13.48	.00	3.39	.221	58.163	15.36	.06
19	24	13.48	.00	8.26	.538	41.719	15.36	.06
19	27	13.48	.00	1.08	.070	18.530	15.36	.06
20	1	13.83	.00	27.50	1.335	76.495	20.59	.10
20	4	13.83	.00	2.28	.111	22.924	20.59	.10
20	8	13.83	.00	1.73	.084	17.394	20.59	.10
20	10	13.83	.00	1.28	.062	12.870	20.59	.10
20	14	13.83	.00	1.05	.051	10.557	20.59	.10
20	15	13.83	.00	2.54	.123	25.538	20.59	.10
20	17	13.83	.00	2.21	.107	22.220	20.59	.10
20	18	13.83	.00	3.20	.155	32.174	20.59	.10
20	19	13.83	.00	26.18	1.271	63.223	20.59	.10
20	21	13.83	.00	13.92	.676	39.957	20.59	.10
20	24	13.83	.00	14.08	.684	41.565	20.59	.10
20	25	13.83	.00	21.84	1.061	19.587	20.59	.10
20	26	13.83	.00	2.06	.100	20.712	20.59	.10
20	27	13.83	.00	4.12	.200	41.424	20.59	.10
20	28	13.83	.00	.14	.007	1.408	20.59	.10
21	1	15.48	.00	22.73	1.124	30.203	20.23	.10
21	2	15.48	.00	14.57	.720	47.561	20.23	.10
21	3	15.48	.00	7.49	.370	75.857	20.23	.10
21	4	15.48	.00	1.84	.091	18.635	20.23	.10
21	5	15.48	.00	12.86	.636	30.243	20.23	.10
21	6	15.48	.00	3.69	.182	37.371	20.23	.10
21	8	15.48	.00	1.35	.067	13.672	20.23	.10
21	9	15.48	.00	1.20	.059	12.153	20.23	.10
21	10	15.48	.00	1.10	.054	11.141	20.23	.10
21	13	15.48	.00	1.09	.054	11.039	20.23	.10
21	14	15.48	.00	1.01	.050	10.229	20.23	.10
21	15	15.48	.00	1.38	.068	13.976	20.23	.10
21	16	15.48	.00	1.40	.069	14.179	20.23	.10
21	19	15.48	.00	20.76	1.026	10.252	20.23	.10
21	20	15.48	.00	17.57	.869	77.944	20.23	.10
21	21	15.48	.00	11.98	.592	21.330	20.23	.10
21	22	15.48	.00	6.00	.297	60.766	20.23	.10
21	23	15.48	.00	3.54	.175	35.852	20.23	.10
21	24	15.48	.00	14.23	.704	44.118	20.23	.10
21	27	15.48	.00	14.13	.699	43.105	20.23	.10
21	28	15.48	.00	.30	.015	3.038	20.23	.10
22	1	14.74	.00	12.65	1.133	67.099	11.16	.03
22	2	14.74	.00	10.02	.898	90.777	11.16	.03

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TABLE IIIb

HEAT TRANSFER DATA - HEMISPHERE-CYLINDER MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\dot{q}_{av}/\dot{q}_o$	$\dot{q}_{av}/\dot{q}_{ref}$	$\dot{q}_o$	$\dot{q}_{ref}$
22	3	14.74	.00	4.09	.366	18.690	11.16	.03
22	4	14.74	.00	1.07	.096	31.051	11.16	.03
22	5	14.74	.00	7.08	.634	5.459	11.16	.03
22	6	14.74	.00	2.12	.190	61.522	11.16	.03
22	8	14.74	.00	.86	.077	24.957	11.16	.03
22	9	14.74	.00	.73	.065	21.184	11.16	.03
22	10	14.74	.00	.64	.057	18.573	11.16	.03
22	13	14.74	.00	.68	.061	19.733	11.16	.03
22	14	14.74	.00	.63	.056	18.282	11.16	.03
22	15	14.74	.00	.92	.082	26.698	11.16	.03
22	16	14.74	.00	.84	.075	24.377	11.16	.03
22	19	14.74	.00	11.57	1.036	35.757	11.16	.03
22	20	14.74	.00	9.88	.885	86.714	11.16	.03
22	21	14.74	.00	5.91	.529	71.506	11.16	.03
22	22	14.74	.00	3.12	.280	90.541	11.16	.03
22	24	14.74	.00	4.99	.447	44.808	11.16	.03
22	27	14.74	.00	.74	.066	21.475	11.16	.03
23	1	14.79	20.00	10.08	.957	4.072	10.53	.03
23	2	14.79	20.00	10.94	1.038	30.014	10.53	.03
23	4	14.79	20.00	2.74	.260	82.654	10.53	.03
23	5	14.79	20.00	3.31	.314	99.849	10.53	.03
23	6	14.79	20.00	.62	.059	18.703	10.53	.03
23	8	14.79	20.00	.12	.011	3.620	10.53	.03
23	9	14.79	20.00	.13	.012	3.922	10.53	.03
23	11	14.79	20.00	.05	.005	1.508	10.53	.03
23	13	14.79	20.00	1.78	.169	53.695	10.53	.03
23	14	14.79	20.00	1.60	.152	48.265	10.53	.03
23	15	14.79	20.00	2.16	.205	65.158	10.53	.03
23	16	14.79	20.00	1.77	.168	53.394	10.53	.03
23	17	14.79	20.00	1.96	.186	59.125	10.53	.03
23	24	14.79	20.00	2.73	.259	82.353	10.53	.03
23	25	14.79	20.00	9.16	.870	76.319	10.53	.03
24	1	14.78	20.00	12.71	1.198	81.239	10.61	.03
24	2	14.78	20.00	5.16	.487	54.775	10.61	.03
24	3	14.78	20.00	1.48	.140	44.393	10.61	.03
24	4	14.78	20.00	.35	.033	10.498	10.61	.03
24	5	14.78	20.00	9.71	.916	91.253	10.61	.03
24	6	14.78	20.00	4.54	.428	36.178	10.61	.03
24	8	14.78	20.00	2.04	.192	61.190	10.61	.03
24	9	14.78	20.00	1.83	.173	54.891	10.61	.03
24	10	14.78	20.00	1.84	.174	55.191	10.61	.03
24	11	14.78	20.00	1.64	.155	49.192	10.61	.03
24	14	14.78	20.00	.23	.022	6.899	10.61	.03
24	15	14.78	20.00	.28	.026	8.399	10.61	.03
24	25	14.78	20.00	7.03	.663	10.866	10.61	.03
24	26	14.78	20.00	.65	.061	19.497	10.61	.03
24	27	14.78	20.00	.25	.024	7.499	10.61	.03
25	1	14.70	20.00	7.29	.658	9.156	11.07	.03
25	6	14.70	20.00	1.42	.128	40.741	11.07	.03
25	13	14.70	20.00	.75	.068	21.518	11.07	.03
25	14	14.70	20.00	.64	.058	18.362	11.07	.03
25	15	14.70	20.00	.99	.089	28.404	11.07	.03
25	16	14.70	20.00	.93	.084	26.683	11.07	.03
25	17	14.70	20.00	.91	.082	26.109	11.07	.03
25	18	14.70	20.00	5.89	.532	68.989	11.07	.03
25	19	14.70	20.00	8.23	.743	36.126	11.07	.03
25	20	14.70	20.00	6.31	.570	81.039	11.07	.03
25	21	14.70	20.00	2.66	.240	76.318	11.07	.03

TABLE IIIb

HEAT TRANSFER DATA - HEMISPHERE-CYLINDER MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\dot{q}_{av}/\dot{q}_o$	$\dot{q}_{av}/\dot{q}_{ref}$	$\dot{q}_o$	$\dot{q}_{ref}$
25	22	14.70	20.00	1.45	.131	41.602	11.07	.03
25	23	14.70	20.00	.80	.072	22.953	11.07	.03
25	24	14.70	20.00	9.27	.837	65.964	11.07	.03
25	25	14.70	20.00	13.44	1.214	85.605	11.07	.03
25	26	14.70	20.00	2.67	.241	76.605	11.07	.03
25	27	14.70	20.00	2.15	.194	61.685	11.07	.03
25	28	14.70	20.00	2.13	.192	61.112	11.07	.03
26	1	15.08	20.00	10.31	.691	74.530	14.92	.06
26	6	15.08	20.00	1.64	.110	27.762	14.92	.06
26	13	15.08	20.00	.72	.048	12.188	14.92	.06
26	14	15.08	20.00	.50	.034	8.464	14.92	.06
26	15	15.08	20.00	.76	.051	12.865	14.92	.06
26	16	15.08	20.00	.79	.053	13.373	14.92	.06
26	17	15.08	20.00	.80	.054	13.543	14.92	.06
26	18	15.08	20.00	.49	.033	8.295	14.92	.06
26	19	15.08	20.00	15.72	1.054	66.111	14.92	.06
26	20	15.08	20.00	15.62	1.047	64.418	14.92	.06
26	21	15.08	20.00	12.50	.838	11.602	14.92	.06
26	22	15.08	20.00	8.41	.564	42.366	14.92	.06
26	23	15.08	20.00	5.44	.365	92.089	14.92	.06
26	24	15.08	20.00	3.15	.211	53.324	14.92	.06
26	25	15.08	20.00	6.60	.442	11.726	14.92	.06
26	26	15.08	20.00	.37	.025	6.263	14.92	.06
26	27	15.08	20.00	.31	.021	5.248	14.92	.06
26	28	15.08	20.00	.08	.005	1.354	14.92	.06
27	1	15.09	50.00	7.42	.496	25.607	14.95	.06
27	2	15.09	50.00	13.84	.926	34.286	14.95	.06
27	3	15.09	50.00	16.04	1.073	71.528	14.95	.06
27	4	15.09	50.00	9.61	.643	62.680	14.95	.06
27	5	15.09	50.00	1.04	.070	17.605	14.95	.06
27	7	15.09	50.00	.22	.015	3.724	14.95	.06
27	9	15.09	50.00	.12	.008	2.031	14.95	.06
27	11	15.09	50.00	.18	.012	3.047	14.95	.06
27	13	15.09	50.00	7.11	.476	20.359	14.95	.06
27	14	15.09	50.00	10.46	.700	77.069	14.95	.06
27	15	15.09	50.00	12.76	.854	16.004	14.95	.06
27	16	15.09	50.00	10.19	.682	72.498	14.95	.06
27	17	15.09	50.00	10.01	.670	69.451	14.95	.06
27	24	15.09	50.00	1.39	.093	23.530	14.95	.06
27	25	15.09	50.00	6.60	.442	11.726	14.95	.06
28	1	15.16	50.00	7.06	.511	25.619	13.81	.06
28	2	15.16	50.00	2.06	.149	36.654	13.81	.06
28	3	15.16	50.00	.39	.028	6.939	13.81	.06
28	4	15.16	50.00	.27	.020	4.804	13.81	.06
28	5	15.16	50.00	15.51	1.123	75.970	13.81	.06
28	6	15.16	50.00	12.10	.876	15.296	13.81	.06
28	7	15.16	50.00	9.01	.652	60.315	13.81	.06
28	8	15.16	50.00	7.82	.566	39.142	13.81	.06
28	9	15.16	50.00	7.81	.566	38.964	13.81	.06
28	10	15.16	50.00	7.79	.564	38.608	13.81	.06
28	11	15.16	50.00	7.60	.550	35.227	13.81	.06
28	18	15.16	50.00	1.94	.141	34.519	13.81	.06
28	27	15.16	50.00	.27	.020	4.804	13.81	.06
29	1	15.13	50.00	6.95	.487	21.346	14.28	.06
29	2	15.13	50.00	13.37	.936	33.438	14.28	.06
29	3	15.13	50.00	15.25	1.068	66.263	14.28	.06

TABLE IIIb

HEAT TRANSFER DA... - HEMISPHERE-CYLINDER MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\dot{q}_{av}/\dot{q}_o$	$\dot{q}_{av}/\dot{q}_{ref}$	$\dot{q}_o$	$\dot{q}_{ref}$
29	4	15.13	50.00	9.60	.672	67.614	14.28	.06
29	5	15.13	50.00	.94	.066	16.412	14.28	.06
29	7	15.13	50.00	2.17	.152	37.888	14.28	.06
29	9	15.13	50.00	.11	.008	1.921	14.28	.06
29	11	15.13	50.00	.19	.013	3.317	14.28	.06
29	13	15.13	50.00	7.27	.509	26.933	14.28	.06
29	14	15.13	50.00	10.87	.761	89.788	14.28	.06
29	15	15.13	50.00	12.63	.884	20.518	14.28	.06
29	16	15.13	50.00	9.97	.698	74.075	14.28	.06
29	17	15.13	50.00	9.55	.669	66.742	14.28	.06
29	24	15.13	50.00	1.32	.092	23.047	14.28	.06
29	25	15.13	50.00	6.22	.436	8.600	14.28	.06
59	1	6.40	.00	130.15	1.63	72.28	80.00	1.80
59	2	6.40	.00	141.19	1.76	78.41	80.00	1.80
59	3	6.40	.00	76.95	.96	42.73	80.00	1.80
59	4	6.40	.00	19.81	.25	11.01	80.00	1.80
59	5	6.40	.00	128.69	1.61	71.46	80.00	1.80
59	6	6.40	.00	44.65	.56	24.80	80.00	1.80
59	7	6.40	.00	19.45	.24	10.80	80.00	1.80
59	8	6.40	.00	19.52	.24	10.84	80.00	1.80
59	9	6.40	.00	17.91	.22	9.95	80.00	1.80
59	10	6.40	.00	17.61	.22	9.78	80.00	1.80
59	11	6.40	.00	14.50	.18	8.06	80.00	1.80
59	12	6.40	.00	14.88	.19	8.27	80.00	1.80
59	19	6.40	.00	112.69	1.41	62.57	80.00	1.80
59	20	6.40	.00	116.43	1.46	64.66	80.00	1.80
59	21	6.40	.00	121.74	1.52	67.60	80.00	1.80
59	22	6.40	.00	73.77	.92	40.97	80.00	1.80
59	23	6.40	.00	38.74	.48	21.52	80.00	1.80
59	24	6.40	.00	146.74	1.83	81.48	80.00	1.80
59	26	6.40	.00	21.39	.27	11.89	80.00	1.80
60	4	6.38	.00	25.80	.31	13.58	84.20	1.90
60	6	6.38	.00	52.72	.63	27.75	84.20	1.90
60	7	6.38	.00	20.55	.24	10.82	84.20	1.90
60	8	6.38	.00	21.22	.25	11.17	84.20	1.90
60	10	6.38	.00	19.41	.23	10.22	84.20	1.90
60	11	6.38	.00	16.65	.20	8.79	84.20	1.90
60	12	6.38	.00	17.08	.20	9.00	84.20	1.90
60	13	6.38	.00	21.78	.26	11.49	84.20	1.90
60	14	6.38	.00	22.08	.26	11.65	84.20	1.90
60	15	6.38	.00	23.66	.28	12.47	84.20	1.90
60	16	6.38	.00	19.75	.23	10.42	84.20	1.90
60	17	6.38	.00	20.54	.24	10.83	84.20	1.90
60	25	6.38	.00	163.24	1.94	86.03	84.20	1.90
61	1	6.38	10.00	115.[illegible]	1.33	58.76	87.39	1.97
61	3	6.38	10.00	57.[illegible]	.66	29.09	87.39	1.97
61	4	6.38	10.00	11.04	.13	5.59	87.39	1.97
61	6	6.38	10.00	78.79	.90	39.92	87.39	1.97
61	7	6.38	10.00	39.82	.46	20.19	87.39	1.97
61	8	6.38	10.00	36.15	.41	18.33	87.39	1.97
61	9	6.38	10.00	36.59	.42	18.54	87.39	1.97
61	10	6.38	10.00	35.46	.41	17.98	87.39	1.97
61	11	6.38	10.00	29.42	.34	14.92	87.39	1.97
61	12	6.38	10.00	29.46	.34	14.94	87.39	1.97
61	13	6.38	10.00	10.65	.12	5.40	87.39	1.97
61	14	6.38	10.00	12.05	.14	6.11	87.39	1.97
61	24	6.38	10.00	121.66	1.39	61.64	87.39	1.97
61	25	6.38	10.00	225.97	2.59	114.50	87.39	1.97
61	27	6.38	10.00	290.48	3.32	147.18	87.39	1.97

TABLE IIIb

HEAT TRANSFER DATA - HEMISPHERE-CYLINDER MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\dot{q}_{av}/\dot{q}_o$	$\dot{q}_{av}/\dot{q}_{ref}$	$\dot{q}_o$	$\dot{q}_{ref}$
62	1	6.38	10.00	87.91	1.04	46.39	84.63	1.90
62	3	6.38	10.00	82.90	.98	43.75	84.63	1.90
62	4	6.38	10.00	41.50	.49	21.90	84.63	1.90
62	5	6.38	10.00	108.16	1.28	57.06	84.63	1.90
62	6	6.38	10.00	27.10	.32	14.30	84.63	1.90
62	7	6.38	10.00	8.73	.10	4.61	84.63	1.90
62	9	6.38	10.00	9.99	.12	5.27	84.63	1.90
62	11	6.38	10.00	10.80	.13	5.71	84.63	1.90
62	12	6.38	10.00	10.10	.12	5.34	84.63	1.90
62	13	6.38	10.00	36.65	.43	19.35	84.63	1.90
62	14	6.38	10.00	39.78	.47	20.99	84.63	1.90
62	15	6.38	10.00	43.06	.51	22.72	84.63	1.90
62	16	6.38	10.00	37.08	.44	19.57	84.63	1.90
62	17	6.38	10.00	35.34	.42	18.65	84.63	1.90
62	24	6.38	10.00	141.44	1.67	74.62	84.63	1.90
62	25	6.38	10.00	117.24	1.39	61.85	84.63	1.90
63	1	6.38	20.00	96.70	1.11	48.90	87.24	1.98
63	2	6.38	20.00	86.32	.99	43.65	87.24	1.98
63	4	6.38	20.00	67.73	.78	34.25	87.24	1.98
63	5	6.38	20.00	79.45	.91	40.18	87.24	1.98
63	6	6.38	20.00	13.48	.15	6.83	87.24	1.98
63	7	6.38	20.00	3.55	.04	1.81	87.24	1.98
63	9	6.38	20.00	2.66	.03	1.35	87.24	1.98
63	11	6.38	20.00	7.59	.09	3.84	87.24	1.98
63	12	6.38	20.00	9.08	.10	4.60	87.24	1.98
63	13	6.38	20.00	62.19	.71	31.46	87.24	1.98
63	14	6.38	20.00	67.25	.77	34.02	87.24	1.98
63	15	6.38	20.00	71.49	.82	36.16	87.24	1.98
63	16	6.38	20.00	63.82	.73	32.28	87.24	1.98
63	17	6.38	20.00	63.63	.73	32.18	87.24	1.98
63	24	6.38	20.00	143.92	1.65	72.79	87.24	1.98
63	25	6.38	20.00	132.86	1.52	67.19	87.24	1.98
64	1	6.38	20.00	148.39	1.74	77.58	85.08	1.91
64	2	6.38	20.00	127.41	1.50	66.61	85.08	1.91
64	3	6.38	20.00	34.93	.41	18.26	85.08	1.91
64	4	6.38	20.00	3.57	.04	1.87	85.08	1.91
64	5	6.38	20.00	151.69	1.78	79.29	85.08	1.91
64	6	6.38	20.00	108.26	1.27	56.60	85.08	1.91
64	7	6.38	20.00	63.10	.74	32.98	85.08	1.91
64	8	6.38	20.00	59.69	.70	31.21	85.08	1.91
64	9	6.38	20.00	58.08	.68	30.36	85.08	1.91
64	10	6.38	20.00	54.50	.64	28.49	85.08	1.91
64	11	6.38	20.00	47.95	.56	25.06	85.08	1.91
64	12	6.38	20.00	53.33	.63	27.88	85.08	1.91
64	14	6.38	20.00	2.08	.02	1.09	85.08	1.91
65	1	5.95	20.00	295.18	1.33	66.09	222.78	4.47
65	2	5.95	20.00	274.81	1.23	61.53	222.78	4.47
65	3	5.95	20.00	95.43	.43	21.37	222.78	4.47
65	4	5.95	20.00	8.32	.04	1.87	222.78	4.47
65	5	5.95	20.00	304.06	1.36	68.08	222.78	4.47
65	6	5.95	20.00	242.70	1.09	54.34	222.78	4.47
65	7	5.95	20.00	142.00	.64	31.80	222.78	4.47
65	8	5.95	20.00	142.92	.64	32.01	222.78	4.47
65	9	5.95	20.00	125.24	[illegible]	28.02	222.78	4.47
65	10	5.95	20.00	120.41	[illegible]	26.96	222.78	4.47
65	11	5.95	20.00	109.26	.49	24.44	222.78	4.47
65	12	5.95	20.00	124.13	.56	27.79	222.78	4.47
65	24	5.95	20.00	387.82	1.74	86.84	222.78	4.47

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TABLE IIIb

HEAT TRANSFER DATA - HEMISPHERE-CYLINDER MODEL

Run	Gage No.	M_∞	α	$\dot{q}_{av}$	$\dot{q}_{av}/\dot{q}_o$	$\dot{q}_{av}/\dot{q}_{ref}$	$\dot{q}_o$	$\dot{q}_{ref}$
65	27	5.95	20.00	148.56	.67	33.26	222.78	4.47
66	1	5.61	20.00	512.99	1.73	81.32	296.37	6.31
66	4	5.61	20.00	213.14	.72	33.78	296.37	6.31
66	5	5.61	20.00	268.97	.91	42.63	296.37	6.31
66	6	5.61	20.00	37.75	.13	5.99	296.37	6.31
66	7	5.61	20.00	10.69	.04	1.69	296.37	6.31
66	9	5.61	20.00	6.95	.02	1.10	296.37	6.31
66	11	5.61	20.00	17.26	.06	2.74	296.37	6.31
66	12	5.61	20.00	32.42	.11	5.14	296.37	6.31
66	13	5.61	20.00	223.09	.75	35.36	296.37	6.31
66	14	5.61	20.00	316.19	1.07	50.13	296.37	6.31
66	15	5.61	20.00	272.14	.92	43.13	296.37	6.31
66	16	5.61	20.00	223.47	.75	35.43	296.37	6.31
66	17	5.61	20.00	223.24	.75	35.39	296.37	6.31
66	24	5.61	20.00	854.71	2.88	135.47	296.37	6.31
67	3	5.61	.00	326.63	1.10	51.55	297.15	6.34
67	5	5.61	.00	513.28	1.73	81.00	297.15	6.34
67	7	5.61	.00	60.37	.20	9.54	297.15	6.34
67	9	5.61	.00	66.20	.22	10.45	297.15	6.34
67	10	5.61	.00	69.44	.23	10.97	297.15	6.34
67	11	5.61	.00	55.32	.19	8.74	297.15	6.34
67	12	5.61	.00	58.16	.20	9.19	297.15	6.34
67	13	5.61	.00	65.17	.22	10.29	297.15	6.34
67	15	5.61	.00	97.68	.33	15.42	297.15	6.34
67	16	5.61	.00	79.63	.27	12.57	297.15	6.34
67	17	5.61	.00	80.10	.27	12.64	297.15	6.34
67	19	5.61	.00	716.48	2.41	113.06	297.15	6.34
67	20	5.61	.00	618.09	2.08	97.53	297.15	6.34
67	21	5.61	.00	332.67	1.12	52.50	297.15	6.34
67	24	5.61	.00	548.24	1.85	86.51	297.15	6.34
67	27	5.61	.00	254.05	.85	40.09	297.15	6.34

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
36	1	15.16	.00	.00	1.37	.03	13.77	.06	4.682	.553	44.07	.10
36	2	15.16	.00	.00	.97	.02	9.75	.04	3.315	.532	44.07	.10
36	4	15.16	.00	.00	.66	.01	6.63	.03	2.255	.501	44.07	.10
36	5	15.16	.00	.00	.57	.01	5.73	.02	1.948	.482	44.07	.10
36	6	15.16	.00	.00	.52	.01	5.23	.02	1.777	.480	44.07	.10
36	7	15.16	.00	.00	.44	.01	4.42	.02	1.504	.437	44.07	.10
36	8	15.16	.00	.00	.49	.01	4.93	.02	1.674	.512	44.07	.10
36	9	15.16	.00	.00	.46	.01	4.62	.02	1.572	.503	44.07	.10
36	12	15.16	.00	.00	.42	.01	4.22	.02	1.435	.459	44.07	.10
36	13	15.16	.00	.00	.49	.01	4.93	.02	1.674	.535	44.07	.10
36	14	15.16	.00	.00	.51	.01	5.13	.02	1.743	.557	44.07	.10
36	15	15.16	.00	.00	.46	.01	4.62	.02	1.572	.389	44.07	.10
37	1	15.14	.00-	15.00	1.26	.03	12.39	.05	4.252	.500	44.62	.10
37	2	15.14	.00-	15.00	.84	.02	8.26	.03	2.835	.453	44.62	.10
37	4	15.14	.00-	15.00	.41	.01	4.03	.02	1.384	.306	44.62	.10
37	5	15.14	.00-	15.00	.28	.01	2.75	.01	.945	.233	44.62	.10
37	6	15.14	.00-	15.00	.39	.01	3.83	.02	1.316	.354	44.62	.10
37	7	15.14	.00-	15.00	.58	.01	5.70	.02	1.957	.567	44.62	.10
37	8	15.14	.00-	15.00	1.08	.02	10.62	.04	3.645	1.109	44.62	.10
37	10	15.14	.00-	15.00	1.60	.04	15.73	.07	5.400	1.792	44.62	.10
37	11	15.14	.00-	15.00	1.81	.04	17.80	.08	6.108	5.816	44.62	.10
37	12	15.14	.00-	15.00	1.05	.02	10.32	.04	3.544	1.129	44.62	.10
37	13	15.14	.00-	15.00	1.18	.03	11.60	.05	3.982	1.268	44.62	.10
37	14	15.14	.00-	15.00	.82	.02	8.06	.03	2.767	.881	44.62	.10
37	15	15.14	.00-	15.00	.47	.01	4.62	.02	1.586	.391	44.62	.10
38	1	15.12	.00-	30.00	1.34	.00	13.27	.06	4.559	.532	.00	.10
38	2	15.12	.00-	30.00	.88	.00	8.72	.04	2.994	.474	.00	.10
38	4	15.12	.00-	30.00	.32	.00	3.17	.01	1.089	.239	.00	.10
38	5	15.12	.00-	30.00	.18	.00	1.78	.01	.612	.149	.00	.10
38	6	15.12	.00-	30.00	.33	.00	3.27	.01	1.123	.299	.00	.10
38	7	15.12	.00-	30.00	.81	.00	8.02	.03	2.756	.791	.00	.10
38	8	15.12	.00-	30.00	1.54	.00	15.26	.06	5.239	1.581	.00	.10
38	11	15.12	.00-	30.00	6.29	.00	62.31	.26	21.399	20.202	.00	.10
38	15	15.12	.00-	30.00	.27	.00	2.67	.01	.919	.224	.00	.10
39	1	15.15	.00-	30.00	1.20	.03	12.14	.05	4.159	.487	43.75	.10

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{q_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
39	2	15.15	.00-	30.00	1.14	.03	11.40	.05	3.952	.629	43.75	.10
39	4	15.15	.00-	30.00	.41	.01	4.15	.02	1.421	.313	43.75	.10
39	5	15.15	.00-	30.00	.36	.01	3.64	.02	1.248	.306	43.75	.10
39	6	15.15	.00-	30.00	.39	.01	3.94	.02	1.352	.362	43.75	.10
39	7	15.15	.00-	30.00	.63	.01	6.37	.03	2.183	.629	43.75	.10
39	8	15.15	.00-	30.00	1.47	.03	14.87	.06	5.094	1.544	43.75	.10
39	9	15.15	.00-	30.00	4.68	.11	47.33	.20	16.218	5.142	43.75	.10
39	10	15.15	.00-	30.00	14.93	.34	151.00	.62	51.739	17.100	43.75	.10
39	11	15.15	.00-	30.00	8.41	.19	85.06	.35	29.144	27.633	43.75	.10
39	12	15.15	.00-	30.00	5.45	.12	55.12	.23	18.887	5.988	43.75	.10
39	13	15.15	.00-	30.00	7.06	.16	71.40	.30	24.466	7.757	43.75	.10
39	14	15.15	.00-	30.00	9.72	.22	98.31	.41	33.684	10.680	43.75	.10
39	15	15.15	.00-	30.00	.28	.01	2.83	.01	.970	.238	43.75	.10
40	1	15.15	.00	.00	1.15	.03	11.93	.05	4.116	.480	42.69	.10
40	2	15.15	.00	.00	.75	.02	7.78	.03	2.685	.425	42.69	.10
40	3	15.15	.00	.00	.66	.02	6.60	.03	2.363	.452	42.69	.10
40	4	15.15	.00	.00	.52	.01	5.39	.02	1.861	.408	42.69	.10
40	5	15.15	.00	.00	.56	.01	5.81	.02	2.004	.489	42.69	.10
40	6	15.15	.00	.00	.49	.01	5.08	.02	1.754	.468	42.69	.10
40	7	15.15	.00	.00	.44	.01	4.56	.02	1.575	.452	42.69	.10
40	8	15.15	.00	.00	.44	.01	4.56	.02	1.575	.475	42.69	.10
40	9	15.15	.00	.00	.36	.01	3.73	.02	1.289	.407	42.69	.10
40	10	15.15	.00	.00	.22	.01	2.20	.01	.788	.259	42.69	.10
40	11	15.15	.00	.00	.44	.01	4.56	.02	1.575	.533	42.69	.10
40	13	15.15	.00	.00	.26	.01	2.70	.01	.931	.294	42.69	.10
40	14	15.15	.00	.00	.48	.01	4.98	.02	1.718	.542	42.69	.10
40	15	15.15	.00	.00	.47	.01	4.87	.02	1.682	.411	42.69	.10
41	1	15.14	.00-	45.00	1.47	.03	14.77	.06	5.068	.594	44.01	.10
41	2	15.14	.00-	45.00	.72	.02	7.23	.03	2.482	.395	44.01	.10
41	3	15.14	.00-	45.00	.65	.01	6.53	.03	2.241	.431	44.01	.10
41	4	15.14	.00-	45.00	.71	.02	7.13	.03	2.448	.539	44.01	.10
41	5	15.14	.00-	45.00	.63	.01	6.33	.03	2.172	.533	44.01	.10
41	6	15.14	.00-	45.00	.82	.02	8.24	.03	2.827	.757	44.01	.10
41	7	15.14	.00-	45.00	.85	.02	8.54	.04	2.930	.845	44.01	.10
41	8	15.14	.00-	45.00	2.12	.05	21.29	.09	7.308	2.215	44.01	.10
41	9	15.14	.00-	45.00	13.95	.32	140.12	.58	48.091	15.248	44.01	.10
41	10	15.14	.00-	45.00	22.64	.51	227.41	.94	78.049	25.796	44.01	.10

TABLE IIIc

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N\frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
41	11	15.14	.00-	45.00	7.04	.16	70.72	.29	24.270	8.242	44.01	.10
41	13	15.14	.00-	45.00	37.16	.84	373.26	1.55	28.104	40.618	44.01	.10
41	14	15.14	.00-	45.00	37.80	.86	379.69	1.57	30.311	41.318	44.01	.10
41	15	15.14	.00-	45.00	.46	.01	4.62	.02	1.586	.389	44.01	.10
42	1	15.23	.00-	45.00	1.47	.04	15.98	.06	5.432	.650	40.85	.09
42	2	15.23	.00-	45.00	.62	.02	6.74	.03	2.291	.372	40.85	.09
42	3	15.23	.00-	45.00	.57	.01	6.20	.03	2.106	.413	40.85	.09
42	4	15.23	.00-	45.00	.68	.02	7.39	.03	2.513	.565	40.85	.09
42	5	15.23	.00-	45.00	.63	.02	6.85	.03	2.328	.583	40.85	.09
42	6	15.23	.00-	45.00	.86	.02	9.35	.04	3.178	.869	40.85	.09
42	7	15.23	.00-	45.00	.75	.02	8.15	.03	2.772	.816	40.85	.09
42	8	15.23	.00-	45.00	1.64	.04	17.83	.07	6.061	1.876	40.85	.09
42	9	15.23	.00-	45.00	5.60	.14	60.87	.25	20.695	6.702	40.85	.09
42	10	15.23	.00-	45.00	29.70	.73	322.84	1.31	9.755	37.048	40.85	.09
42	11	15.23	.00-	45.00	19.51	.48	212.07	.86	72.098	25.006	40.85	.09
42	13	15.23	.00-	45.00	6.89	.17	74.89	.30	25.462	8.245	40.85	.09
42	14	15.23	.00-	45.00	7.14	.17	77.61	.31	26.386	8.545	40.85	.09
43	3	15.15	- 15.00	.00	2.27	.05	23.30	.10	8.085	1.547	42.93	.10
43	4	15.15	- 15.00	.00	1.90	.04	19.50	.08	6.767	1.484	42.93	.10
43	5	15.15	- 15.00	.00	1.79	.04	18.37	.08	6.376	1.557	42.93	.10
43	6	15.15	- 15.00	.00	1.65	.04	16.94	.07	5.877	1.567	42.93	.10
43	7	15.15	- 15.00	.00	1.52	.04	15.60	.06	5.414	1.554	42.93	.10
43	8	15.15	- 15.00	.00	1.57	.04	16.12	.07	5.592	1.687	42.93	.10
43	9	15.15	- 15.00	.00	1.52	.04	15.60	.06	5.414	1.709	42.93	.10
43	10	15.15	- 15.00	.00	1.28	.03	13.14	.05	4.559	1.500	42.93	.10
43	11	15.15	- 15.00	.00	1.33	.03	13.65	.06	4.737	1.602	42.93	.10
43	13	15.15	- 15.00	.00	1.74	.04	17.86	.07	6.197	1.956	42.93	.10
43	14	15.15	- 15.00	.00	1.97	.05	20.22	.08	7.017	2.215	42.93	.10
43	15	15.15	- 15.00	.00	1.76	.04	18.07	.07	6.269	1.531	42.93	.10
44	1	15.11	- 15.00	.00	3.74	.09	38.34	.16	13.358	1.524	43.37	.10
44	2	15.11	- 15.00	.00	2.73	.06	27.99	.11	9.751	1.511	43.37	.10
44	3	15.11	- 15.00	.00	2.08	.05	21.32	.09	7.429	1.390	43.37	.10
44	4	15.11	- 15.00	.00	1.83	.04	18.76	.08	6.536	1.402	43.37	.10
44	5	15.11	- 15.00	.00	1.58	.04	16.20	.07	5.643	1.347	43.37	.10
44	6	15.11	- 15.00	.00	1.49	.03	15.27	.06	5.322	1.388	43.37	.10

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{q_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
44	7	15.11	-15.00	.00	1.42	.03	14.56	.06	5.072	1.424	43.37	.10
44	8	15.11	-15.00	.00	1.35	.03	13.84	.06	4.822	1.423	43.37	.10
44	9	15.11	-15.00	.00	1.22	.03	12.51	.05	4.358	1.346	43.37	.10
44	10	15.11	-15.00	.00	1.25	.03	12.81	.05	4.465	1.437	43.37	.10
44	11	15.11	-15.00	.00	1.22	.03	12.51	.05	4.358	1.441	43.37	.10
44	13	15.11	-15.00	.00	1.66	.04	17.02	.07	5.929	1.831	43.37	.10
44	14	15.11	-15.00	.00	1.95	.04	19.99	.08	6.965	2.151	43.37	.10
44	15	15.11	-15.00	.00	1.85	.04	18.96	.08	6.608	1.578	43.37	.10
45	1	15.15	-15.00	-15.00	3.42	.08	34.39	.14	11.858	1.389	43.74	.10
45	2	15.15	-15.00	-15.00	2.59	.06	26.05	.11	8.980	1.429	43.74	.10
45	3	15.15	-15.00	-15.00	2.17	.05	21.82	.09	7.524	1.446	43.74	.10
45	4	15.15	-15.00	-15.00	1.79	.04	18.00	.07	6.207	1.367	43.74	.10
45	5	15.15	-15.00	-15.00	1.68	.04	16.90	.07	5.825	1.428	43.74	.10
45	6	15.15	-15.00	-15.00	1.10	.03	11.06	.05	3.814	1.021	43.74	.10
45	7	15.15	-15.00	-15.00	2.79	.06	28.06	.12	9.674	2.789	43.74	.10
45	8	15.15	-15.00	-15.00	5.31	.12	53.40	.22	18.412	5.580	43.74	.10
45	9	15.15	-15.00	-15.00	5.86	.13	58.93	.25	20.319	6.443	43.74	.10
45	10	15.15	-15.00	-15.00	5.56	.13	55.92	.23	19.278	6.371	43.74	.10
45	11	15.15	-15.00	-15.00	4.67	.11	46.97	.20	16.192	5.499	43.74	.10
45	13	15.15	-15.00	-15.00	6.72	.15	67.58	.28	23.300	7.388	43.74	.10
45	14	15.15	-15.00	-15.00	9.88	.23	99.36	.41	34.257	10.862	43.74	.10
45	15	15.15	-15.00	-15.00	1.77	.04	17.80	.07	6.137	1.505	43.74	.10
46	1	15.13	-15.00	-15.00	3.45	.08	37.97	.15	13.292	1.503	40.88	.09
46	2	15.13	-15.00	-15.00	2.62	.06	28.83	.11	10.094	1.550	40.88	.09
46	3	15.13	-15.00	-15.00	2.13	.05	23.44	.09	8.207	1.522	40.88	.09
46	4	15.13	-15.00	-15.00	1.76	.04	19.37	.08	6.781	1.441	40.88	.09
46	5	15.13	-15.00	-15.00	1.46	.04	16.07	.06	5.625	1.331	40.88	.09
46	6	15.13	-15.00	-15.00	1.03	.03	11.33	.04	3.968	1.025	40.88	.09
46	7	15.13	-15.00	-15.00	2.75	.07	30.26	.12	10.595	2.948	40.88	.09
46	8	15.13	-15.00	-15.00	5.27	.13	57.99	.23	20.304	5.937	40.88	.09
46	9	15.13	-15.00	-15.00	5.52	.14	60.75	.24	21.268	6.507	40.88	.09
46	10	15.13	-15.00	-15.00	5.19	.13	57.11	.22	19.996	6.377	40.88	.09
46	11	15.13	-15.00	-15.00	4.37	.11	48.09	.19	16.837	5.517	40.88	.09
46	13	15.13	-15.00	-15.00	6.47	.16	71.20	.28	24.928	7.627	40.88	.09
46	14	15.13	-15.00	-15.00	8.26	.20	90.90	.35	31.824	9.736	40.88	.09
46	15	15.13	-15.00	-15.00	1.70	.04	18.71	.07	6.550	1.550	40.88	.09

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N\frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
47	1	15.15	-15.00	-30.00	3.62	.09	38.75	.15	13.324	1.541	41.97	.09
47	2	15.15	-15.00	-30.00	2.62	.06	28.04	.11	9.644	1.515	41.97	.09
47	3	15.15	-15.00	-30.00	2.03	.05	21.73	.09	7.472	1.417	41.97	.09
47	4	15.15	-15.00	-30.00	1.06	.03	11.35	.05	3.902	.848	41.97	.09
47	5	15.15	-15.00	-30.00	.94	.02	10.06	.04	3.460	.837	41.97	.09
47	6	15.15	-15.00	-30.00	1.12	.03	11.99	.05	4.122	1.090	41.97	.09
47	7	15.15	-15.00	-30.00	3.53	.08	37.79	.15	12.993	3.697	41.97	.09
47	8	15.15	-15.00	-30.00	17.45	.42	186.78	.74	64.230	19.211	41.97	.09
47	9	15.15	-15.00	-30.00	33.16	.79	354.94	1.41	22.055	38.196	41.97	.09
47	10	15.15	-15.00	-30.00	6.79	.16	72.68	.29	24.993	8.153	41.97	.09
47	11	15.15	-15.00	-30.00	5.17	.12	55.34	.22	19.030	6.378	41.97	.09
47	13	15.15	-15.00	-30.00	14.59	.35	156.17	.62	53.703	16.806	41.97	.09
47	14	15.15	-15.00	-30.00	7.69	.18	82.31	.33	28.305	8.858	41.97	.09
47	15	15.15	-15.00	-30.00	.94	.02	10.06	.04	3.460	.837	41.97	.09
48	1	15.07	-15.00	-30.00	3.46	.08	36.88	.14	12.970	1.446	42.31	.09
48	2	15.07	-15.00	-30.00	2.59	.06	27.61	.11	9.709	1.470	42.31	.09
48	3	15.07	-15.00	-30.00	2.30	.05	24.52	.10	8.622	1.576	42.31	.09
48	4	15.07	-15.00	-30.00	1.03	.02	10.98	.04	3.861	.809	42.31	.09
48	5	15.07	-15.00	-30.00	1.05	.02	11.19	.04	3.936	.918	42.31	.09
48	6	15.07	-15.00	-30.00	1.28	.03	13.64	.05	4.798	1.223	42.31	.09
48	7	15.07	-15.00	-30.00	3.65	.09	38.90	.15	13.683	3.753	42.31	.09
48	8	15.07	-15.00	-30.00	16.25	.38	173.21	.67	60.916	17.563	42.31	.09
48	9	15.07	-15.00	-30.00	31.22	.74	332.77	1.30	17.034	35.305	42.31	.09
48	10	15.07	-15.00	-30.00	5.72	.14	60.97	.24	21.442	6.742	42.31	.09
48	11	15.07	-15.00	-30.00	4.81	.11	51.27	.20	18.031	5.826	42.31	.09
48	13	15.07	-15.00	-30.00	18.36	.43	195.70	.76	68.826	20.762	42.31	.09
48	14	15.07	-15.00	-30.00	6.40	.15	68.22	.27	23.992	7.237	42.31	.09
48	15	15.07	-15.00	-30.00	.91	.02	9.70	.04	3.411	.796	42.31	.09
49	1	15.15	-15.00	.00	1.80	.00	19.08	.08	6.574	.760	.00	.09
49	2	15.15	-15.00	.00	3.40	.00	36.04	.14	12.418	1.951	.00	.09
49	3	15.15	-15.00	.00	2.15	.00	22.79	.09	7.853	1.489	.00	.09
49	4	15.15	-15.00	.00	2.28	.00	24.17	.10	8.327	1.810	.00	.09
49	5	15.15	-15.00	.00	1.85	.00	19.61	.08	6.757	1.635	.00	.09
49	6	15.15	-15.00	.00	3.50	.00	37.10	.15	12.783	3.379	.00	.09
49	7	15.15	-15.00	.00	4.39	.00	46.53	.19	16.034	4.563	.00	.09
49	8	15.15	-15.00	.00	14.55	.00	154.22	.62	53.143	15.895	.00	.09
49	9	15.15	-15.00	.00	40.97	.00	434.24	1.74	49.639	46.828	.00	.09

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N\frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
49	10	15.15	-15.00	.00	12.53	.00	132.81	.53	45.765	14.929	.00	.09
49	11	15.15	-15.00	.00	7.34	.00	77.80	.31	26.809	8.986	.00	.09
49	13	15.15	-15.00	.00	12.13	.00	128.57	.51	44.304	13.865	.00	.09
49	14	15.15	-15.00	.00	17.34	.00	183.79	.73	63.333	19.820	.00	.09
49	15	15.15	-15.00	.00	1.56	.00	16.53	.07	5.698	1.379	.00	.09
50	1	15.12	-15.00	-45.00	3.75	.09	39.64	.16	13.752	1.562	42.53	.09
50	2	15.12	-15.00	-45.00	1.96	.05	20.72	.08	7.188	1.109	42.53	.09
50	3	15.12	-15.00	-45.00	1.78	.04	18.82	.07	6.528	1.216	42.53	.09
50	4	15.12	-15.00	-45.00	2.28	.05	24.10	.10	8.361	1.785	42.53	.09
50	5	15.12	-15.00	-45.00	1.84	.04	19.45	.08	6.748	1.604	42.53	.09
50	6	15.12	-15.00	-45.00	3.66	.09	38.69	.15	13.422	3.485	42.53	.09
50	7	15.12	-15.00	-45.00	3.86	.09	40.80	.16	14.155	3.956	42.53	.09
50	8	15.12	-15.00	-45.00	21.11	.50	223.14	.88	77.413	22.740	42.53	.09
50	9	15.12	-15.00	-45.00	34.72	.82	367.00	1.45	27.323	39.133	42.53	.09
50	10	15.12	-15.00	-45.00	10.72	.25	113.31	.45	39.312	12.595	42.53	.09
50	11	15.12	-15.00	-45.00	7.02	.17	74.20	.29	25.743	8.474	42.53	.09
50	13	15.12	-15.00	-45.00	27.72	.65	293.01	1.16	1.653	31.244	42.53	.09
50	14	15.12	-15.00	-45.00	14.01	.33	148.09	.59	51.377	15.791	42.53	.09
50	15	15.12	-15.00	-45.00	2.18	.05	23.04	.09	7.994	1.900	42.53	.09
51	3	15.15	-15.00	-15.00	1.67	.04	17.84	.07	6.265	1.178	41.56	.09
51	4	15.15	-15.00	-15.00	1.96	.05	20.94	.08	7.353	1.584	41.56	.09
51	5	15.15	-15.00	-15.00	1.91	.05	20.41	.08	7.166	1.719	41.56	.09
51	6	15.15	-15.00	-15.00	3.52	.08	37.61	.15	13.206	3.460	41.56	.09
51	7	15.15	-15.00	-15.00	2.41	.06	25.75	.10	9.041	2.550	41.56	.09
51	8	15.15	-15.00	-15.00	4.57	.11	48.83	.19	17.145	5.082	41.56	.09
51	9	15.15	-15.00	-15.00	16.59	.40	177.27	.71	62.240	19.304	41.56	.09
51	10	15.15	-15.00	-15.00	37.53	.90	401.01	1.60	40.800	45.521	41.56	.09
51	11	15.15	-15.00	-15.00	24.16	.58	258.15	1.03	90.640	30.110	41.56	.09
51	13	15.15	-15.00	-15.00	23.46	.56	250.67	1.00	88.014	27.299	41.56	.09
51	14	15.15	-15.00	-15.00	32.44	.78	346.63	1.38	21.704	37.748	41.56	.09
51	15	15.15	-15.00	-15.00	1.92	.05	20.52	.08	7.203	1.728	41.56	.09
52	3	15.14	-15.00	20.00	2.07	.05	22.18	.09	7.742	1.449	41.76	.09
52	4	15.14	-15.00	20.00	1.85	.04	19.83	.08	6.919	1.484	41.76	.09
52	5	15.14	-15.00	20.00	1.52	.04	16.29	.06	5.685	1.357	41.76	.09
52	6	15.14	-15.00	20.00	1.24	.03	13.29	.05	4.638	1.210	41.76	.09

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{X}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
52	7	15.14	- 15.00	20.00	.46	.01	4.93	.02	1.720	.483	41.76	.09
52	8	15.14	- 15.00	20.00	.31	.01	3.32	.01	1.159	.342	41.76	.09
52	9	15.14	- 15.00	20.00	.20	.00	2.14	.01	.748	.231	41.76	.09
52	10	15.14	- 15.00	20.00	.19	.00	2.04	.01	.711	.229	41.76	.09
52	11	15.14	- 15.00	20.00	.13	.00	1.39	.01	.486	.161	41.76	.09
52	13	15.14	- 15.00	20.00	.28	.01	3.00	.01	1.047	.323	41.76	.09
52	14	15.14	- 15.00	20.00	.28	.01	3.00	.01	1.047	.323	41.76	.09
52	15	15.14	- 15.00	20.00	1.75	.04	18.75	.07	6.545	1.563	41.76	.09
53	1	15.10	- 15.00	45.00	3.63	.08	37.18	.15	13.063	1.477	43.34	.10
53	2	15.10	- 15.00	45.00	2.78	.06	28.48	.11	10.004	1.536	43.34	.10
53	3	15.10	- 15.00	45.00	2.04	.05	20.90	.08	7.341	1.361	43.34	.10
53	4	15.10	- 15.00	45.00	1.99	.05	20.38	.08	7.161	1.522	43.34	.10
53	5	15.10	- 15.00	45.00	1.68	.04	17.21	.07	6.046	1.430	43.34	.10
53	6	15.10	- 15.00	45.00	1.60	.04	16.39	.07	5.758	1.488	43.34	.10
53	7	15.10	- 15.00	45.00	.20	.00	2.05	.01	.720	.200	43.34	.10
53	8	15.10	- 15.00	45.00	.12	.00	1.23	.00	.432	.126	43.34	.10
53	9	15.10	- 15.00	45.00	.10	.00	1.02	.00	.360	.110	43.34	.10
53	10	15.10	- 15.00	45.00	.05	.00	.51	.00	.180	.057	43.34	.10
53	11	15.10	- 15.00	45.00	.11	.00	1.13	.00	.396	.130	43.34	.10
53	13	15.10	- 15.00	45.00	.08	.00	.82	.00	.288	.088	43.34	.10
53	14	15.10	- 15.00	45.00	.16	.00	1.64	.01	.576	.176	43.34	.10
53	15	15.10	- 15.00	45.00	1.83	.04	18.75	.08	6.586	1.558	43.34	.10
54	1	15.10	15.00-	45.00	.24	.01	2.47	.01	.862	.098	43.38	.10
54	2	15.10	15.00-	45.00	.18	.00	1.85	.01	.646	.100	43.38	.10
54	3	15.10	15.00-	45.00	.15	.00	1.54	.01	.539	.100	43.38	.10
54	4	15.10	15.00-	45.00	.16	.00	1.65	.01	.575	.123	43.38	.10
54	5	15.10	15.00-	45.00	.23	.01	2.37	.01	.826	.196	43.38	.10
54	6	15.10	15.00-	45.00	.22	.01	2.26	.01	.790	.205	43.38	.10
54	7	15.10	15.00-	45.00	.18	.00	1.85	.01	.646	.181	43.38	.10
54	8	15.10	15.00-	45.00	.36	.01	3.71	.01	1.293	.380	43.38	.10
54	9	15.10	15.00-	45.00	.50	.01	5.15	.02	1.795	.552	43.38	.10
54	10	15.10	15.00-	45.00	.79	.02	8.13	.03	2.837	.909	43.38	.10
54	11	15.10	15.00-	45.00	1.29	.03	13.28	.05	4.632	1.525	43.38	.10
54	12	15.10	15.00-	45.00	1.34	.03	13.79	.06	4.812	1.479	43.38	.10
54	13	15.10	15.00-	45.00	.42	.01	4.32	.02	1.508	.463	43.38	.10
54	14	15.10	15.00-	45.00	.88	.02	9.06	.04	3.160	.971	43.38	.10
54	15	15.10	15.00-	45.00	.20	.00	2.06	.01	.718	.171	43.38	.10

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{q_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
55	1	15.10	15.00-	15.00	.37	.01	3.79	.02	1.316	.150	43.60	.10
55	2	15.10	15.00-	15.00	.26	.01	2.67	.01	.925	.143	43.60	.10
55	3	15.10	15.00-	15.00	.25	.01	2.56	.01	.889	.166	43.60	.10
55	4	15.10	15.00-	15.00	.20	.00	2.05	.01	.711	.153	43.60	.10
55	5	15.10	15.00-	15.00	.19	.00	1.95	.01	.676	.161	43.60	.10
55	6	15.10	15.00-	15.00	.27	.01	2.77	.01	.960	.250	43.60	.10
55	7	15.10	15.00-	15.00	.24	.01	2.46	.01	.853	.239	43.60	.10
55	8	15.10	15.00-	15.00	.27	.01	2.77	.01	.960	.283	43.60	.10
55	9	15.10	15.00-	15.00	.24	.01	2.46	.01	.853	.263	43.60	.10
55	10	15.10	15.00-	15.00	.27	.01	2.77	.01	.960	.309	43.60	.10
55	11	15.10	15.00-	15.00	.39	.01	4.00	.02	1.387	.459	43.60	.10
55	12	15.10	15.00-	15.00	.24	.01	2.46	.01	.853	.263	43.60	.10
55	13	15.10	15.00-	15.00	.16	.00	1.64	.01	.569	.176	43.60	.10
55	14	15.10	15.00-	15.00	.18	.00	1.85	.01	.640	.198	43.60	.10
55	15	15.10	15.00-	15.00	.19	.00	1.95	.01	.676	.161	43.60	.10
56	1	15.10	15.00	.00	.36	.01	3.75	.01	1.321	.149	42.78	.10
56	2	15.10	15.00	.00	.27	.01	2.82	.01	.990	.151	42.78	.10
56	3	15.10	15.00	.00	.20	.00	2.09	.01	.734	.135	42.78	.10
56	4	15.10	15.00	.00	.17	.00	1.77	.01	.624	.132	42.78	.10
56	5	15.10	15.00	.00	.21	.00	2.19	.01	.770	.181	42.78	.10
56	6	15.10	15.00	.00	.22	.01	2.29	.01	.807	.208	42.78	.10
56	7	15.10	15.00	.00	.21	.00	2.19	.01	.770	.213	42.78	.10
56	8	15.10	15.00	.00	.19	.00	1.90	.01	.697	.203	42.78	.10
56	9	15.10	15.00	.00	.19	.00	1.98	.01	.697	.212	42.78	.10
56	10	15.10	15.00	.00	.19	.00	1.90	.01	.697	.221	42.78	.10
56	11	15.10	15.00	.00	.20	.00	2.09	.01	.734	.239	42.78	.10
56	12	15.10	15.00	.00	.15	.00	1.56	.01	.550	.167	42.78	.10
56	13	15.10	15.00	.00	.13	.00	1.36	.01	.477	.145	42.78	.10
56	14	15.10	15.00	.00	.13	.00	1.36	.01	.477	.145	42.78	.10
56	15	15.10	15.00	.00	.16	.00	1.67	.01	.587	.138	42.78	.10
57	1	15.07	15.00-	30.00	.32	.01	3.47	.01	1.225	.135	41.75	.09
57	3	15.07	15.00-	30.00	.16	.00	1.73	.01	.612	.111	41.75	.09
57	4	15.07	15.00-	30.00	.11	.00	1.19	.00	.421	.087	41.75	.09
57	5	15.07	15.00-	30.00	.17	.00	1.84	.01	.651	.150	41.75	.09
57	6	15.07	15.00-	30.00	.14	.00	1.52	.01	.536	.135	41.75	.09
57	7	15.07	15.00-	30.00	.18	.00	1.95	.01	.689	.187	41.75	.09
57	8	15.07	15.00-	30.00	.26	.01	2.82	.01	.995	.284	41.75	.09

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
57	9	15.07	15.00-	30.00	.26	.01	2.82	.01	.995	.297	41.75	.09
57	10	15.07	15.00-	30.00	.36	.01	3.90	.01	1.378	.429	41.75	.09
57	11	15.07	15.00-	30.00	.44	.01	4.77	.02	1.684	.539	41.75	.09
57	12	15.07	15.00-	30.00	.61	.01	6.61	.03	2.335	.698	41.75	.09
57	13	15.07	15.00-	30.00	.24	.01	2.60	.01	.919	.275	41.75	.09
57	14	15.07	15.00-	30.00	.28	.01	3.03	.01	1.072	.320	41.75	.09
57	15	15.07	15.00-	30.00	.17	.00	1.84	.01	.651	.150	41.75	.09
58	1	15.08	15.00-	45.00	.32	.01	3.29	.01	1.163	.131	43.12	.10
58	2	15.08	15.00-	45.00	.23	.01	2.37	.01	.836	.128	43.12	.10
58	3	15.08	15.00-	45.00	.24	.01	2.47	.01	.872	.161	43.12	.10
58	4	15.08	15.00-	45.00	.20	.00	2.06	.01	.727	.154	43.12	.10
58	5	15.08	15.00-	45.00	.32	.01	3.29	.01	1.163	.274	43.12	.10
58	6	15.08	15.00-	45.00	.26	.01	2.68	.01	.945	.243	43.12	.10
58	7	15.08	15.00-	45.00	.21	.00	2.16	.01	.763	.211	43.12	.10
58	8	15.08	15.00-	45.00	.29	.01	2.99	.01	1.054	.307	43.12	.10
58	9	15.08	15.00-	45.00	.37	.01	3.81	.02	1.344	.409	43.12	.10
58	10	15.08	15.00-	45.00	.63	.01	6.49	.03	2.289	.727	43.12	.10
58	11	15.08	15.00-	45.00	1.03	.02	10.60	.04	3.742	1.220	43.12	.10
58	12	15.08	15.00-	45.00	.99	.02	10.19	.04	3.597	1.095	43.12	.10
58	13	15.08	15.00-	45.00	.59	.01	6.07	.02	2.144	.653	43.12	.10
58	14	15.08	15.00-	45.00	.70	.02	7.21	.03	2.543	.774	43.12	.10
58	15	15.08	15.00-	45.00	.21	.00	2.16	.01	.763	.180	43.12	.10
69	1	6.38	.00	.00	7.15	.04	2.59	.69	.195	.247	202.35	2.76
69	2	6.38	.00	.00	6.01	.03	2.18	.58	.164	.282	202.35	2.76
69	3	6.38	.00	.00	4.78	.02	1.73	.46	.130	.270	202.35	2.76
69	4	6.38	.00	.00	4.21	.02	1.53	.40	.115	.274	202.35	2.76
69	5	6.38	.00	.00	4.43	.02	1.61	.43	.121	.321	202.35	2.76
69	6	6.38	.00	.00	4.30	.02	1.56	.41	.117	.339	202.35	2.76
69	7	6.38	.00	.00	6.40	.03	2.32	.62	.174	.543	202.35	2.76
69	8	6.38	.00	.00	7.83	.04	2.84	.75	.213	.698	202.35	2.76
69	9	6.38	.00	.00	11.02	.05	3.99	1.06	.300	1.029	202.35	2.76
69	10	6.38	.00	.00	13.59	.07	4.93	1.31	.370	1.323	202.35	2.76
69	11	6.38	.00	.00	15.61	.08	5.66	1.50	.425	1.561	202.35	2.76
69	13	6.38	.00	.00	16.21	.08	5.87	1.56	.441	2.966	202.35	2.76
69	14	6.38	.00	.00	18.51	.09	6.71	1.78	.504	1.728	202.35	2.76
69	15	6.38	.00	.00	4.10	.02	1.49	.39	.112	.297	202.35	2.76

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{q_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
70	1	6.37	15.00	.00	1.94	.01	.69	.18	.052	.065	203.42	2.8C
70	2	6.37	15.00	.00	.72	.00	.26	.07	.019	.032	203.42	2.80
70	3	6.37	15.00	.00	.67	.00	.24	.06	.018	.037	203.42	2.80
70	4	6.37	15.00	.00	.44	.00	.16	.04	.012	.028	203.42	2.80
70	5	6.37	15.00	.00	.58	.00	.21	.06	.016	.042	203.42	2.80
70	6	6.37	15.00	.00	.66	.00	.24	.06	.018	.052	203.42	2.80
70	7	6.37	15.00	.00	1.16	.01	.41	.11	.031	.096	203.42	2.80
70	8	6.37	15.00	.00	1.41	.01	.50	.13	.038	.124	203.42	2.80
70	9	6.37	15.00	.00	2.52	.01	.90	.24	.068	.232	203.42	2.80
70	10	6.37	15.00	.00	2.57	.01	.92	.24	.069	.245	203.42	2.80
70	11	6.37	15.00	.00	4.81	.02	1.71	.46	.130	.474	203.42	2.80
70	13	6.37	15.00	.00	4.35	.02	1.55	.41	.117	.781	203.42	2.80
70	14	6.37	15.00	.00	1.73	.01	.62	.16	.047	.160	203.42	2.80
70	15	6.37	15.00	.00	5.56	.03	1.98	.53	.150	.395	203.42	2.80
71	10	6.38	-15.00	.00	66.70	.33	24.04	6.60	1.789	6.593	200.03	2.77
71	11	6.38	-15.00	.00	64.16	.32	23.13	6.35	1.720	6.513	200.03	2.77
71	13	6.38	-15.00	.00	61.00	.30	21.99	6.04	1.636	11.344	200.03	2.77
71	14	6.38	-15.00	.00	50.33	.25	18.14	4.98	1.350	4.773	200.03	2.77
72	1	6.38	-15.00	.00	63.38	.00	22.01	6.09	1.643	2.134	.00	2.88
72	2	6.38	-15.00	.00	100.64	.00	35.00	9.68	2.608	4.601	.00	2.88
72	3	6.38	-15.00	.00	84.17	.00	29.27	8.09	2.181	4.647	.00	2.88
72	4	6.38	-15.00	.00	77.46	.00	26.94	7.45	2.007	4.902	.00	2.88
72	5	6.38	-15.00	.00	74.31	.00	25.84	7.14	1.926	5.236	.00	2.88
72	6	6.38	-15.00	.00	72.16	.00	25.09	6.94	1.870	5.552	.00	2.88
72	7	6.38	-15.00	.00	80.38	.00	27.95	7.73	2.083	6.659	.00	2.88
72	8	6.38	-15.00	.00	66.73	.00	23.21	6.42	1.729	5.809	.00	2.88
72	9	6.38	-15.00	.00	65.68	.00	22.84	6.31	1.702	5.983	.00	2.88
72	10	6.38	-15.00	.00	70.84	.00	24.63	6.81	1.836	6.727	.00	2.88
72	11	6.38	-15.00	.00	69.17	.00	24.05	6.65	1.792	6.747	.00	2.88
72	13	6.38	-15.00	.00	66.41	.00	23.09	6.38	1.721	11.865	.00	2.88
72	14	6.38	-15.00	.00	51.52	.00	17.92	4.95	1.335	4.693	.00	2.88
72	15	6.38	-15.00	.00	74.84	.00	26.03	7.19	1.939	5.271	.00	2.88
73	1	6.37	-15.00	.00	89.87	.43	30.59	8.64	2.287	2.986	208.14	2.94
73	2	6.37	-15.00	.00	107.61	.52	36.63	10.35	2.739	4.857	208.14	2.94
73	3	6.37	-15.00	.00	87.31	.42	29.72	8.39	2.222	4.758	208.14	2.94

TABLE I-Ic

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
73	4	6.37	-15.00	.00	82.86	.40	28.20	7.97	2.109	5.177	208.14	2.94
73	5	6.37	-15.00	.00	81.52	.39	27.75	7.84	2.075	5.670	208.14	2.94
73	6	6.37	-15.00	.00	74.52	.36	25.36	7.16	1.896	5.658	208.14	2.94
73	7	6.37	-15.00	.00	83.31	.40	28.35	8.01	2.120	6.811	208.14	2.94
73	8	6.37	-15.00	.00	72.90	.35	24.81	7.01	1.855	6.264	208.14	2.94
73	9	6.37	-15.00	.00	74.47	.36	25.35	7.16	1.895	6.695	208.14	2.94
73	10	6.37	-15.00	.00	73.93	.36	25.16	7.11	1.881	6.927	208.14	2.94
73	11	6.37	-15.00	.00	72.03	.35	24.52	6.92	1.833	6.936	208.14	2.94
73	13	6.37	-15.00	.00	115.97	.56	39.47	11.15	2.951	20.447	208.14	2.94
73	14	6.37	-15.00	.00	51.48	.25	17.52	4.95	1.310	4.628	208.14	2.94
73	15	6.37	-15.00	.00	76.30	.37	25.97	7.34	1.942	5.306	208.14	2.94
74	1	6.38	-15.00	-15.00	76.99	.37	26.36	7.47	1.953	2.584	208.32	2.92
74	2	6.38	-15.00	-15.00	101.93	.49	34.90	9.89	2.585	4.645	208.32	2.92
74	3	6.38	-15.00	-15.00	86.37	.41	29.58	8.38	2.191	4.754	208.32	2.92
74	4	6.38	-15.00	-15.00	80.94	.39	27.72	7.86	2.053	5.106	208.32	2.92
74	5	6.38	-15.00	-15.00	78.98	.38	27.05	7.67	2.003	5.545	208.32	2.92
74	6	6.38	-15.00	-15.00	75.01	.36	25.69	7.28	1.903	5.754	208.32	2.92
74	7	6.38	-15.00	-15.00	262.95	1.26	90.04	25.52	6.670	21.714	208.32	2.92
74	8	6.38	-15.00	-15.00	228.19	1.10	78.14	22.15	5.788	19.804	208.32	2.92
74	9	6.38	-15.00	-15.00	227.84	1.09	78.02	22.12	5.779	20.689	208.32	2.92
74	10	6.38	-15.00	-15.00	206.34	.99	70.66	20.03	5.234	19.532	208.32	2.92
74	11	6.38	-15.00	-15.00	217.58	1.04	74.51	21.12	5.519	21.161	208.32	2.92
74	13	6.38	-15.00	-15.00	207.95	1.00	71.21	20.19	5.275	37.035	208.32	2.92
74	14	6.38	-15.00	-15.00	167.82	.81	57.47	16.29	4.257	15.240	208.32	2.92
74	15	6.38	-15.00	-15.00	70.04	.34	23.98	6.80	1.777	4.920	208.32	2.92
75	2	6.38	-15.00	-15.00	93.49	.50	35.86	9.75	2.673	4.715	198.84	2.75
75	3	6.38	-15.00	-15.00	81.67	.41	29.74	8.08	2.216	4.720	198.84	2.75
75	4	6.38	-15.00	-15.00	78.51	.39	28.59	7.77	2.131	5.203	198.84	2.75
75	5	6.38	-15.00	-15.00	75.77	.38	27.59	7.50	2.056	5.588	198.84	2.75
75	6	6.38	-15.00	-15.00	64.57	.32	23.51	6.39	1.752	5.201	198.84	2.75
75	7	6.38	-15.00	-15.00	256.04	1.29	93.23	25.35	6.948	22.205	198.84	2.75
75	8	6.38	-15.00	-15.00	220.39	1.11	80.25	21.82	5.981	20.090	198.84	2.75
75	9	6.38	-15.00	-15.00	209.90	1.06	76.43	20.78	5.696	20.019	198.84	2.75
75	10	6.38	-15.00	-15.00	194.10	.98	70.68	19.21	5.267	19.295	198.84	2.75
75	11	6.38	-15.00	-15.00	193.43	.97	70.43	19.15	5.249	19.758	198.84	2.75
75	12	6.38	-15.00	-15.00	206.63	1.04	75.24	20.45	5.607	19.706	198.84	2.75
75	13	6.38	-15.00	-15.00	200.72	1.01	73.09	19.87	5.447	19.143	198.84	2.75

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TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
75	14	6.38	- 15.00-	15.00	154.44	.78	56.23	15.29	4.191	14.729	198.84	2.75
75	15	6.38	- 15.00-	15.00	66.39	.33	24.17	6.57	1.802	4.898	198.84	2.75
76	2	6.38	- 15.00-	30.00	101.34	.49	35.29	9.74	2.631	4.638	207.21	2.87
76	3	6.38	- 15.00-	30.00	83.60	.40	29.12	8.04	2.170	4.619	207.21	2.87
76	4	6.38	- 15.00-	30.00	78.71	.38	27.41	7.57	2.043	4.985	207.21	2.87
76	5	6.38	- 15.00-	30.00	74.28	.36	25.87	7.14	1.928	5.236	207.21	2.87
76	6	6.38	- 15.00-	30.00	74.16	.36	25.83	7.13	1.925	5.710	207.21	2.87
76	7	6.38	- 15.00-	30.00	537.73	2.60	187.28	51.69	13.960	44.582	207.21	2.87
76	8	6.38	- 15.00-	30.00	417.75	2.02	145.49	40.16	10.845	36.401	207.21	2.87
76	9	6.38	- 15.00-	30.00	335.49	1.62	116.84	32.25	8.710	30.589	207.21	2.87
76	10	6.38	- 15.00-	30.00	177.24	.86	61.73	17.04	4.601	16.843	207.21	2.87
76	11	6.38	- 15.00-	30.00	158.77	.77	55.30	15.26	4.122	15.504	207.21	2.87
76	12	6.38	- 15.00-	30.00	338.08	1.63	117.74	32.50	8.777	30.824	207.21	2.87
76	13	6.38	- 15.00-	30.00	322.56	1.56	112.34	31.01	8.374	29.409	207.21	2.87
76	14	6.38	- 15.00-	30.00	528.42	7.38	532.31	146.94	39.680	39.353	207.21	2.87
76	15	6.38	- 15.00-	30.00	73.68	.36	25.66	7.08	1.913	5.196	207.21	2.87
77	2	6.38	- 15.00-	45.00	102.70	.51	37.65	9.97	2.826	4.875	200.00	2.73
77	3	6.38	- 15.00-	45.00	87.24	.44	31.98	8.47	2.401	5.001	200.00	2.73
77	4	6.38	- 15.00-	45.00	102.05	.51	37.41	9.91	2.809	6.708	200.00	2.73
77	5	6.38	- 15.00-	45.00	105.93	.53	38.84	10.28	2.915	7.748	200.00	2.73
77	6	6.38	- 15.00-	45.00	132.20	.66	48.47	12.83	3.638	10.561	200.00	2.73
77	7	6.38	- 15.00-	45.00	226.49	1.13	83.04	21.99	6.233	19.481	200.00	2.73
77	8	6.38	- 15.00-	45.00	454.25	2.27	166.54	44.09	12.502	41.068	200.00	2.73
77	9	6.38	- 15.00-	45.00	536.76	2.68	196.79	52.10	14.773	50.774	200.00	2.73
77	10	6.38	- 15.00-	45.00	340.35	1.70	124.78	33.04	9.367	33.558	200.00	2.73
77	11	6.38	- 15.00-	45.00	307.48	1.54	112.73	29.85	8.462	31.149	200.00	2.73
77	12	6.38	- 15.00-	45.00	528.16	2.64	193.64	51.27	14.536	49.960	200.00	2.73
77	13	6.38	- 15.00-	45.00	433.24	2.17	158.84	42.05	11.923	40.979	200.00	2.73
77	14	6.38	- 15.00-	45.00	198.09	.99	72.56	19.23	5.455	18.741	200.00	2.73
77	15	6.38	- 15.00-	45.00	94.43	.47	34.62	9.17	2.599	6.908	200.00	2.73
78	2	6.37	- 15.00-	45.00	104.58	.51	36.76	10.05	2.766	4.811	204.16	2.84
78	3	6.37	- 15.00-	45.00	98.16	.48	34.51	9.44	2.597	5.454	204.16	2.84
78	4	6.37	- 15.00-	45.00	98.27	.48	34.54	9.45	2.599	6.258	204.16	2.84
78	5	6.37	- 15.00-	45.00	102.51	.50	36.03	9.85	2.712	7.268	204.16	2.84
78	6	6.37	- 15.00-	45.00	135.07	.66	47.48	12.99	3.573	10.459	204.16	2.84

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TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
78	7	6.37	-15.00	-45.00	205.19	1.01	72.13	19.73	5.428	17.105	204.16	2.84
78	8	6.37	-15.00	-45.00	384.95	1.89	135.32	37.01	10.183	33.727	204.16	2.84
78	9	6.37	-15.00	-45.00	566.17	2.77	199.02	54.43	14.976	51.899	204.16	2.84
78	10	6.37	-15.00	-45.00	491.02	2.41	172.61	47.20	12.988	46.916	204.16	2.84
78	11	6.37	-15.00	-45.00	364.70	1.79	128.20	35.06	9.647	35.806	204.16	2.84
78	14	6.37	-15.00	-45.00	513.52	2.52	180.51	49.37	13.584	47.075	204.16	2.84
78	15	6.37	-15.00	-45.00	107.87	.53	37.92	10.37	2.853	7.646	204.16	2.84
79	2	6.38	-15.00	-45.00	74.59	.36	26.25	7.17	1.961	3.435	205.91	2.84
79	3	6.38	-15.00	-45.00	82.78	.40	29.14	7.96	2.176	4.602	205.91	2.84
79	4	6.38	-15.00	-45.00	95.68	.46	33.68	9.20	2.515	6.098	205.91	2.84
79	5	6.38	-15.00	-45.00	106.82	.52	37.60	10.27	2.808	7.579	205.91	2.84
79	6	6.38	-15.00	-45.00	123.20	.60	43.36	11.84	3.239	9.548	205.91	2.84
79	7	6.38	-15.00	-45.00	245.75	1.19	86.50	23.63	6.461	20.504	205.91	2.84
79	8	6.38	-15.00	-45.00	413.49	2.01	145.54	39.75	10.871	36.260	205.91	2.84
79	9	6.38	-15.00	-45.00	588.00	2.86	206.97	56.53	15.459	53.950	205.91	2.84
79	10	6.38	-15.00	-45.00	432.81	2.10	152.34	41.61	11.379	41.394	205.91	2.84
79	11	6.38	-15.00	-45.00	337.71	1.64	118.87	32.47	8.878	33.184	205.91	2.84
79	13	6.38	-15.00	-45.00	602.14	2.92	211.94	57.89	15.830	55.245	205.91	2.84
79	14	6.38	-15.00	-45.00	288.76	1.40	101.64	27.76	7.592	26.495	205.91	2.84
79	15	6.38	-15.00	-45.00	107.01	.52	37.67	10.29	2.813	7.592	205.91	2.84
80	1	6.38	-15.00	20.00	41.56	.20	14.82	4.03	1.107	1.429	203.34	2.80
80	2	6.38	-15.00	20.00	109.38	.54	39.01	10.62	2.912	5.107	203.34	2.80
80	3	6.38	-15.00	20.00	89.54	.44	31.93	8.69	2.384	5.049	203.34	2.80
80	4	6.38	-15.00	20.00	82.41	.41	29.39	8.00	2.194	5.326	203.34	2.80
80	5	6.38	-15.00	20.00	80.56	.40	28.73	7.82	2.145	5.797	203.34	2.80
80	6	6.38	-15.00	20.00	66.93	.33	23.87	6.50	1.782	5.260	203.34	2.80
80	7	6.38	-15.00	20.00	11.30	.06	4.03	1.10	.301	.956	203.34	2.80
80	8	6.38	-15.00	20.00	10.14	.05	3.62	.98	.270	.902	203.34	2.80
80	9	6.38	-15.00	20.00	8.65	.04	3.08	.84	.230	.804	203.34	2.80
80	10	6.38	-15.00	20.00	8.00	.04	2.85	.78	.213	.776	203.34	2.80
80	11	6.38	-15.00	20.00	7.33	.04	2.61	.71	.195	.730	203.34	2.80
80	13	6.38	-15.00	20.00	8.26	.04	2.95	.80	.220	1.508	203.34	2.80
80	14	6.38	-15.00	20.00	11.35	.06	4.05	1.10	.302	1.055	203.34	2.80
80	15	6.38	-15.00	20.00	73.51	.36	26.22	7.14	1.957	5.289	203.34	2.80
81	1	6.38	-15.00	45.00	50.06	.24	17.39	4.81	1.296	1.684	207.52	2.88

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TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N\frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
81	2	6.38	- 15.00	45.00	106.04	.51	36.84	10.19	2.745	4.846	207.52	2.88
81	3	6.38	- 15.00	45.00	88.55	.43	30.77	8.51	2.292	4.886	207.52	2.88
81	4	6.38	- 15.00	45.00	81.94	.39	28.47	7.88	2.121	5.183	207.52	2.88
81	5	6.38	- 15.00	45.00	78.68	.38	27.34	7.56	2.037	5.541	207.52	2.88
81	6	6.38	- 15.00	45.00	72.95	.35	25.35	7.01	1.888	5.609	207.52	2.88
81	7	6.38	- 15.00	45.00	1.30	.01	.45	.12	.034	.109	207.52	2.88
81	8	6.38	- 15.00	45.00	2.51	.01	.87	.24	.065	.218	207.52	2.88
81	9	6.38	- 15.00	45.00	3.49	.02	1.21	.34	.090	.317	207.52	2.88
81	10	6.38	- 15.00	45.00	7.24	.03	2.52	.70	.187	.686	207.52	2.88
81	11	6.38	- 15.00	45.00	3.80	.02	1.32	.37	.098	.369	207.52	2.88
81	12	6.38	- 15.00	45.00	3.42	.02	1.19	.33	.089	.313	207.52	2.88
81	14	6.38	- 15.00	45.00	4.50	.02	1.56	.43	.116	.408	207.52	2.88
81	15	6.38	- 15.00	45.00	74.60	.36	25.92	7.17	1.931	5.252	207.52	2.88
82	1	6.38	.00-	15.00	7.38	.04	2.59	.72	.192	.250	205.44	2.85
82	2	6.38	.00-	15.00	6.24	.03	2.19	.61	.163	.289	205.44	2.85
82	3	6.38	.00-	15.00	5.19	.03	1.82	.50	.135	.289	205.44	2.85
82	4	6.38	.00-	15.00	4.91	.02	1.72	.48	.128	.314	205.44	2.85
82	5	6.38	.00-	15.00	5.54	.03	1.94	.54	.144	.393	205.44	2.85
82	6	6.38	.00-	15.00	7.36	.04	2.58	.71	.192	.573	205.44	2.85
82	15	6.38	.00-	15.00	4.51	.02	1.58	.44	.118	.322	205.44	2.85
83	1	6.38	.00-	15.00	7.51	.04	2.62	.72	.195	.253	207.08	2.87
83	2	6.38	.00-	15.00	5.90	.03	2.06	.57	.153	.270	207.08	2.87
83	3	6.38	.00-	15.00	5.27	.03	1.84	.51	.137	.291	207.08	2.87
83	4	6.38	.00-	15.00	4.72	.02	1.65	.45	.123	.300	207.08	2.87
83	5	6.38	.00-	15.00	4.90	.02	1.71	.47	.127	.345	207.08	2.87
83	6	6.38	.00-	15.00	7.66	.04	2.67	.74	.199	.590	207.08	2.87
83	7	6.38	.00-	15.00	120.74	.58	42.10	11.61	3.139	10.018	207.08	2.87
83	8	6.38	.00-	15.00	106.77	.52	37.23	10.26	2.776	9.311	207.08	2.87
83	9	6.38	.00-	15.00	91.21	.44	31.78	8.77	2.372	8.325	207.08	2.87
83	10	6.38	.00-	15.00	90.75	.44	31.64	8.72	2.359	8.630	207.08	2.87
83	11	6.38	.00-	15.00	85.53	.41	29.82	8.22	2.224	8.359	207.08	2.87
83	12	6.38	.00-	15.00	99.03	.48	34.53	9.52	2.574	9.033	207.08	2.87
83	14	6.38	.00-	15.00	82.94	.40	28.92	7.97	2.156	7.566	207.08	2.87
83	15	6.38	.00-	15.00	4.54	.02	1.58	.44	.118	.320	207.08	2.87
84	1	6.38	.00-	30.00	7.54	.04	2.65	.72	.198	.256	206.17	2.85

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
84	2	6.38	.00-	30.00	6.73	.03	2.36	.65	.176	.309	206.17	2.85
84	3	6.38	.00-	30.00	5.41	.03	1.90	.52	.142	.301	206.17	2.85
84	4	6.38	.00-	30.00	6.73	.03	2.36	.65	.176	.427	206.17	2.85
84	5	6.38	.00-	30.00	10.33	.05	3.63	.99	.271	.732	206.17	2.85
84	6	6.38	.00-	30.00	25.41	.12	8.93	2.44	.666	1.966	206.17	2.85
84	7	6.38	.00-	30.00	291.67	1.41	102.45	28.04	7.649	24.305	206.17	2.85
84	8	6.38	.00-	30.00	247.16	1.20	86.82	23.76	6.482	21.647	206.17	2.85
84	9	6.38	.00-	30.00	225.00	1.09	79.03	21.63	5.901	20.619	206.17	2.85
84	10	6.38	.00-	30.00	195.18	.95	68.56	18.76	5.119	18.645	206.17	2.85
84	11	6.38	.00-	30.00	192.50	.93	67.62	18.51	5.048	18.892	206.17	2.85
84	12	6.38	.00-	30.00	211.47	1.03	74.28	20.33	5.546	19.379	206.17	2.85
84	14	6.38	.00-	30.00	144.86	.70	50.88	13.93	3.799	13.275	206.17	2.85
84	15	6.38	.00-	30.00	5.02	.02	1.76	.48	.132	.357	206.17	2.85
85	1	6.37	.00-	45.00	8.16	.04	2.84	.78	.214	.273	206.19	2.87
85	2	6.37	.00-	45.00	6.72	.03	2.34	.64	.176	.305	206.19	2.87
85	6	6.37	.00-	45.00	35.13	.17	12.24	3.35	.922	2.688	206.19	2.87
85	7	6.37	.00-	45.00	150.02	.73	52.28	14.28	3.939	12.366	206.19	2.87
85	8	6.37	.00-	45.00	427.64	2.07	149.02	40.72	11.229	37.049	206.19	2.87
85	9	6.37	.00-	45.00	626.29	3.04	218.25	59.64	16.445	56.771	206.19	2.87
85	10	6.37	.00-	45.00	266.92	1.29	93.02	25.42	7.009	25.222	206.19	2.87
85	11	6.37	.00-	45.00	293.55	1.42	102.30	27.95	7.708	28.500	206.19	2.87
85	12	6.37	.00-	45.00	566.99	2.75	197.58	53.99	14.888	51.396	206.19	2.87
85	14	6.37	.00-	45.00	342.63	1.66	119.40	32.63	8.997	31.059	206.19	2.87
86	1	6.37	15.00-	45.00	7.33	.04	2.56	.70	.193	.246	205.97	2.86
86	2	6.37	15.00-	45.00	6.87	.03	2.40	.65	.181	.313	205.97	2.86
86	3	6.37	15.00-	45.00	8.82	.04	3.08	.84	.232	.485	205.97	2.86
86	4	6.37	15.00-	45.00	5.94	.03	2.07	.57	.156	.374	205.97	2.86
86	5	6.37	15.00-	45.00	7.95	.04	2.78	.76	.209	.557	205.97	2.86
86	7	6.37	15.00-	45.00	8.97	.04	3.13	.85	.236	.740	205.97	2.86
86	8	6.37	15.00-	45.00	12.12	.06	4.23	1.15	.319	1.051	205.97	2.86
86	9	6.37	15.00-	45.00	24.66	.12	8.61	2.35	.649	2.238	205.97	2.86
86	10	6.37	15.00-	45.00	53.71	.26	18.75	5.11	1.413	5.079	205.97	2.86
86	11	6.37	15.00-	45.00	70.31	.34	24.55	6.69	1.850	6.832	205.97	2.86
86	12	6.37	15.00-	45.00	23.91	.12	8.35	2.28	.629	2.169	205.97	2.86
86	14	6.37	15.00-	45.00	53.70	.26	18.75	5.11	1.413	4.872	205.97	2.86
86	15	6.37	15.00-	45.00	6.66	.03	2.33	.63	.175	.467	205.97	2.86

D2:80910

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{\dot{q}_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N \frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
87	1	6.37	15.00-	30.00	1.89	.01	.64	.18	.048	.061	211.86	2.96
87	2	6.37	15.00-	30.00	2.77	.01	.94	.26	.071	.123	211.86	2.96
87	3	6.37	15.00-	30.00	4.36	.02	1.48	.41	.111	.232	211.86	2.96
87	4	6.37	15.00-	30.00	3.89	.02	1.32	.36	.099	.237	211.86	2.96
87	5	6.37	15.00-	30.00	4.26	.02	1.44	.40	.109	.291	211.86	2.96
87	6	6.37	15.00-	30.00	9.14	.04	3.09	.85	.233	.679	211.86	2.96
87	7	6.37	15.00-	30.00	6.48	.03	2.19	.61	.165	.518	211.86	2.96
87	8	6.37	15.00-	30.00	12.61	.06	4.27	1.18	.322	1.062	211.86	2.96
87	9	6.37	15.00-	30.00	23.12	.11	7.82	2.16	.589	2.033	211.86	2.96
87	10	6.37	15.00-	30.00	36.33	.17	12.29	3.39	.926	3.332	211.86	2.96
87	11	6.37	15.00-	30.00	46.65	.22	15.79	4.36	1.189	4.396	211.86	2.96
87	12	6.37	15.00-	30.00	26.11	.12	8.83	2.44	.666	2.299	211.86	2.96
87	14	6.37	15.00-	30.00	12.69	.06	4.29	1.19	.324	1.118	211.86	2.96
87	15	6.37	15.00-	30.00	5.42	.03	1.83	.51	.138	.368	211.86	2.96
88	1	6.37	15.00-	15.00	2.46	.01	.84	.23	.063	.081	208.80	2.93
88	2	6.37	15.00-	15.00	1.17	.01	.40	.11	.030	.053	208.80	2.93
88	4	6.37	15.00-	15.00	.50	.00	.17	.05	.013	.032	208.80	2.93
88	5	6.37	15.00-	15.00	.68	.00	.23	.06	.017	.046	208.80	2.93
88	6	6.37	15.00-	15.00	1.50	.01	.51	.14	.038	.112	208.80	2.93
88	7	6.37	15.00-	15.00	3.32	.02	1.13	.32	.085	.270	208.80	2.93
88	8	6.37	15.00-	15.00	7.77	.04	2.65	.74	.199	.665	208.80	2.93
88	9	6.37	15.00-	15.00	13.22	.06	4.51	1.26	.339	1.185	208.80	2.93
88	10	6.37	15.00-	15.00	17.38	.08	5.93	1.65	.445	1.622	208.80	2.93
88	11	6.37	15.00-	15.00	18.29	.09	6.24	1.74	.468	1.752	208.80	2.93
88	12	6.37	15.00-	15.00	14.16	.07	4.83	1.35	.363	1.269	208.80	2.93
88	14	6.37	15.00-	15.00	2.53	.01	.86	.24	.065	.227	208.80	2.93
88	15	6.37	15.00-	15.00	5.78	.03	1.97	.55	.148	.400	208.80	2.93
89	1	6.37	.00-	45.00	21.66	.10	7.50	2.06	.565	.723	206.93	2.89
89	2	6.37	.00-	45.00	19.95	.10	6.91	1.90	.520	.904	206.93	2.89
89	3	6.37	.00-	45.00	25.13	.12	8.71	2.39	.655	1.375	206.93	2.89
89	4	6.37	.00-	45.00	27.11	.13	9.39	2.58	.707	1.702	206.93	2.89
89	5	6.37	.00-	45.00	28.60	.14	9.91	2.72	.746	1.999	206.93	2.89
89	6	6.37	.00-	45.00	32.69	.16	11.33	3.11	.852	2.493	206.93	2.89
89	7	6.37	.00-	45.00	68.00	.33	23.56	6.47	1.773	5.586	206.93	2.89
89	8	6.37	.00-	45.00	198.99	.96	68.94	18.95	5.188	17.178	206.93	2.89
89	9	6.37	.00-	45.00	287.93	1.39	99.76	27.42	7.507	26.008	206.93	2.89
89	10	6.37	.00-	45.00	360.62	1.74	124.94	34.34	9.402	33.953	206.93	2.89

TABLE III c

HEAT TRANSFER DATA - FLAT PLATE MODEL

Run	Gage No.	M_∞	α	δ_F	$\dot{q}_{av}$	$\frac{\dot{q}_{av}}{q_o}$	$\frac{\dot{q}_{av}}{\dot{q}_{ref}}$	$\frac{\dot{q}_{av}}{H_o - H_w}$	$C_H \times 10^3$	$C_H\sqrt{R_N\frac{x}{12}}$	$\dot{q}_o$	$\dot{q}_{ref}$
89	11	6.37	.00-	45.00	431.47	2.09	1[illegible].49	41.08	11.249	41.740	206.93	2.89
89	14	6.37	.00-	45.00	353.97	1.71	122.64	33.71	9.229	31.973	206.93	2.89
89	15	6.37	.00-	45.00	35.86	.17	12.42	3.41	.935	2.505	206.93	2.89
90	1	5.93	- 15.00	.00	39.30	.07	6.04	1.44	.661	.449	539.45	6.50
90	2	5.93	- 15.00	.00	42.73	.08	6.57	1.57	.719	.664	539.45	6.50
90	3	5.93	- 15.00	.00	33.34	.06	5.13	1.22	.561	.625	539.45	6.50
90	4	5.93	- 15.00	.00	64.99	.12	9.99	2.38	1.093	1.396	539.45	6.50
90	5	5.93	- 15.00	.00	143.28	.27	22.03	5.25	2.409	3.426	539.45	6.50
90	6	5.93	- 15.00	.00	134.32	.25	20.65	4.92	2.259	3.509	539.45	6.50
90	7	5.93	- 15.00	.00	146.24	.27	22.48	5.36	2.459	4.112	539.45	6.50
90	8	5.93	- 15.00	.00	126.19	.23	19.40	4.62	2.122	3.730	539.45	6.50
90	9	5.93	- 15.00	.00	123.74	.23	19.02	4.53	2.081	3.827	539.45	6.50
90	10	5.93	- 15.00	.00	114.25	.21	17.56	4.18	1.921	3.682	539.45	6.50
90	11	5.93	- 15.00	.00	116.15	.22	17.86	4.25	1.953	3.847	539.45	6.50
90	14	5.93	- 15.00	.00	94.97	.18	14.60	3.48	1.597	2.937	539.45	6.50
90	15	5.93	- 15.00	.00	73.18	.14	11.25	2.68	1.231	1.751	539.45	6.50

FIGURE INDEX

Figure 17 — Pressure and Heat Transfer Distribution on the Compression and Expansion Sides of a Hemisphere Cylinder at $\alpha = 20°$

$M_\infty = 6.38$, $R_N/ft. = 14 \times 10^6$ (17a through 17c)

Figure 18 — Pressure and Heat Transfer Variations Around a Hemisphere Cylinder at $\alpha = 20°$

$M \approx 14.8$, $R_N/ft. \approx 6 \times 10^4$ (18a through 18c)

Figure 19 — Pressure and Heat Transfer Distribution on the Compression and Expansion Sides of a Hemisphere Cylinder at $\alpha = 50°$

$M \approx 15.1$, $R_N/ft. \approx 1.1 \times 10^5$ (19a through 19c)

Figure 20 — Effect of Angle of Attack on the Axial Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\delta_F = 0°$

$M_\infty = 6.38$, $R_N/ft. = 14 \times 10$ (20a through 20d)

Figure 21 — Effect of Angle of Attack on the Axial Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\delta_F = 0$, $M = 15.1$, $R_N/ft. = 1.15 \times 10^5$ (21a through 21d)

Figure 22 — Effect of Flap Deflections on Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\alpha = 0$, $M_\infty = 6.38$, $R_N/ft. = 14 \times 10^6$ (22a through 22c)

Figure 23 — Effect of Flap Deflections on Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\alpha = 0°$, $M_\infty = 15.1$, $R_N/ft. = 1.15 \times 10^5$ (23a through 23d)

Figure 24 — Effect of Flap Deflections on the Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\alpha = -15°$, $M_\infty = 6.38$, $R_N/ft. = 14 \times 10^6$ (24a through 24b)

Figure 25 — Effect of Flap Deflections on the Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\alpha = -15°$, $M_\infty = 15.1$, $R_N/ft. = 1.1 \times 10^5$ (25a through 25d)

Figure 26 — Effect of Flap Deflections on the Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\alpha = -15°$, $M_\infty = 15.1$, $R_N/ft. = 1.1 \times 10^5$

Flag Gap Open

Figure Index for
Rpt. AA-1661-Y-1

Figure 27 — Effect of Flap Deflections on the Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\alpha = +15°$, $M = 6.37$, $R_N/ft. = 14 \times 10^6$ (27a through 27d)

Figure 28 — Effect of Flap Deflections on the Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\alpha = +15°$, $M_\infty = 15.1$, $R_N/ft. = 1.1 \times 10^5$ (28a through 28d)

Figure 29 — Effect of Span Variation on the Pressure and Heat Transfer Distributions over a Sharp Flat Plate

$\alpha = 0$, $\delta_F = -45°$, $M_\infty = 6.37$, $R_N/ft. = 1.38 \times 10^6$ (29a through 29f)

Figure 30 — Effect of Span Variation on the Pressure and Heat Transfer Distributions Over a Sharp Flat Plate

$\alpha = 0$, $\delta_F = -45°$, $M_\infty = 15.1$, $R_N/ft. = 1.1 \times 10^6$ (30a thru 30d)

Figure 31 — Effects of Span Variation on the Pressure and Heat Transfer Distributions Over a Sharp Flat Plate

$\alpha = -15°$, $\delta_F = -45°$, $M_\infty = 6.38$, $R_N/ft. = 13.6 \times 10^6$
(31a thru 31f)

Figure 32 — Effect of Span Variation on Pressure and Heat Transfer Distributions Over a Sharp Flat Plate

$\alpha = -15°$, $\delta_F = -45°$, $M_\infty = 15.1$, $R_N/ft. = 1.1 \times 10^5$
(32a thru 32d)

Figure 33 — Effect of Flap Gap Seal on the Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\alpha = -15°$, $\delta_F = 0$, $M_\infty = 6.38$, $R_N/ft. = 14 \times 10^6$ (33a thru 33c)

Figure 34 — Effect of Flap Gap Seal on the Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\alpha = -15°$, $\delta_F = -15°$, $M_\infty = 6.38$, $R_N/ft. = 14 \times 10^6$ (34a thru 34c)

Figure 35 — Effect of Flap Gap Seal on the Pressure and Heat Transfer Distribution on a Sharp Flat Plate

$\alpha = -15°$, $\delta_F = -45°$, $M_\infty = 6.38$, $R_N/ft. = 14 \times 10^6$

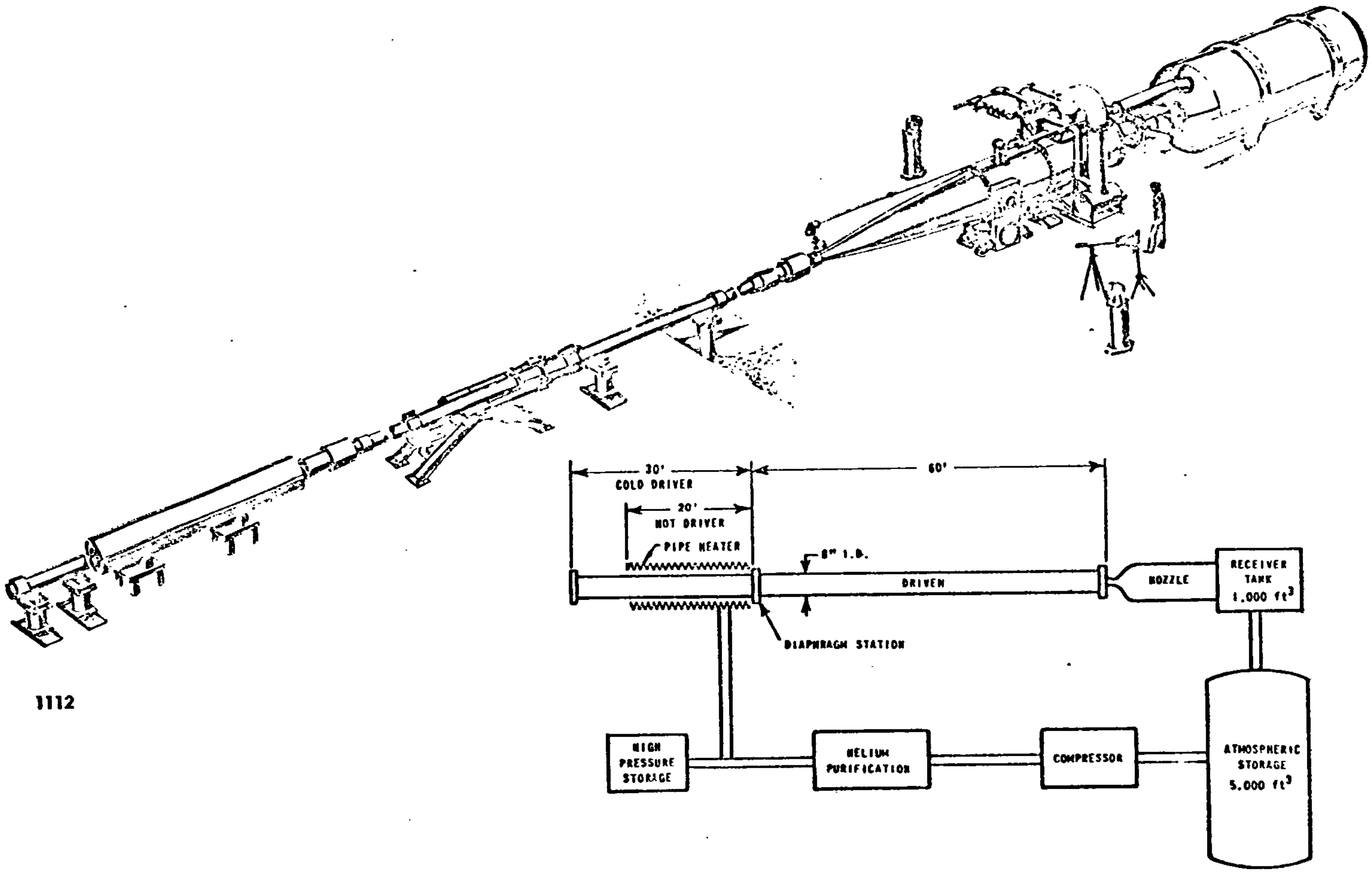
(35a thru 35f)

Figure 36 — Effect of Variation in Test Conditions on the Pressure and Heat transfer Distributions Over a Sharp Flat Plate

$\alpha = -15°$, $\delta_F = 0°$, $M = 5.93 \rightarrow 6.38$, $R_N/ft. = 3.9 \times 10^6 \rightarrow 14.26 \times 10^6$

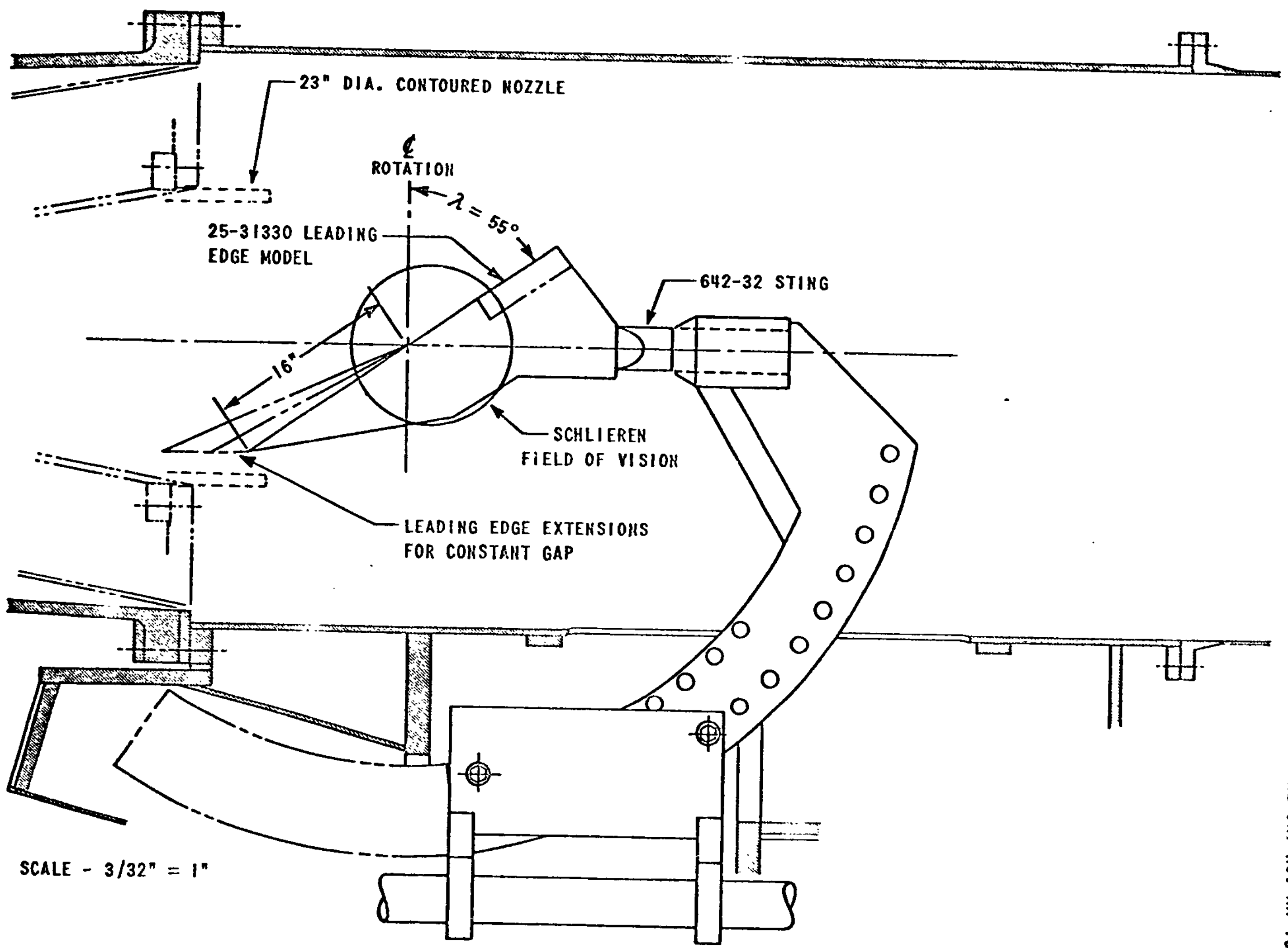
(36a thru 36c)

37



1112

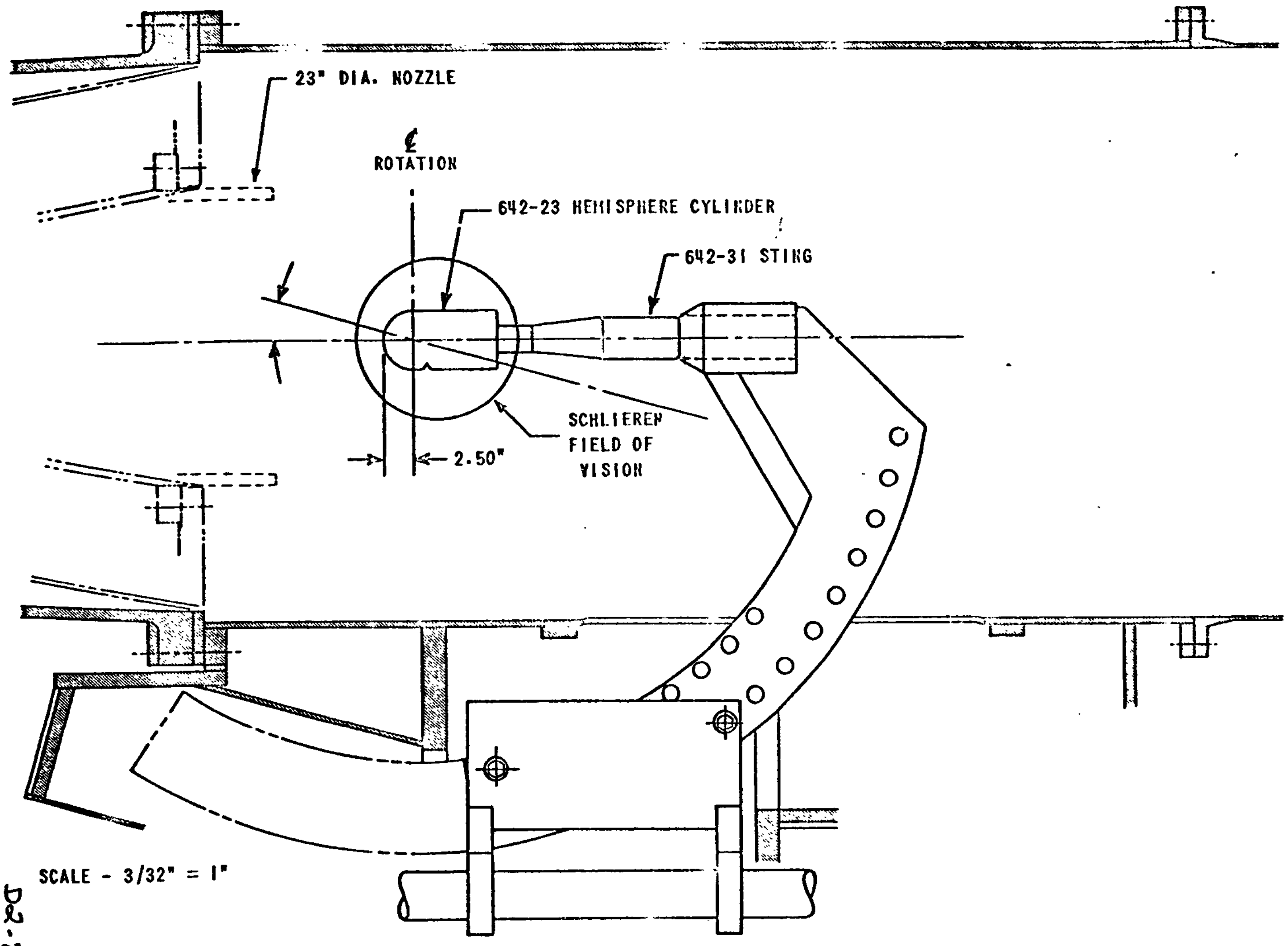
Figure 1 BASIC COMPONENTS OF THE CORNELL AERONAUTICAL LABORATORY 48" HYPERSONIC SHOCK TUNNEL



SCALE - 3/32" = 1"

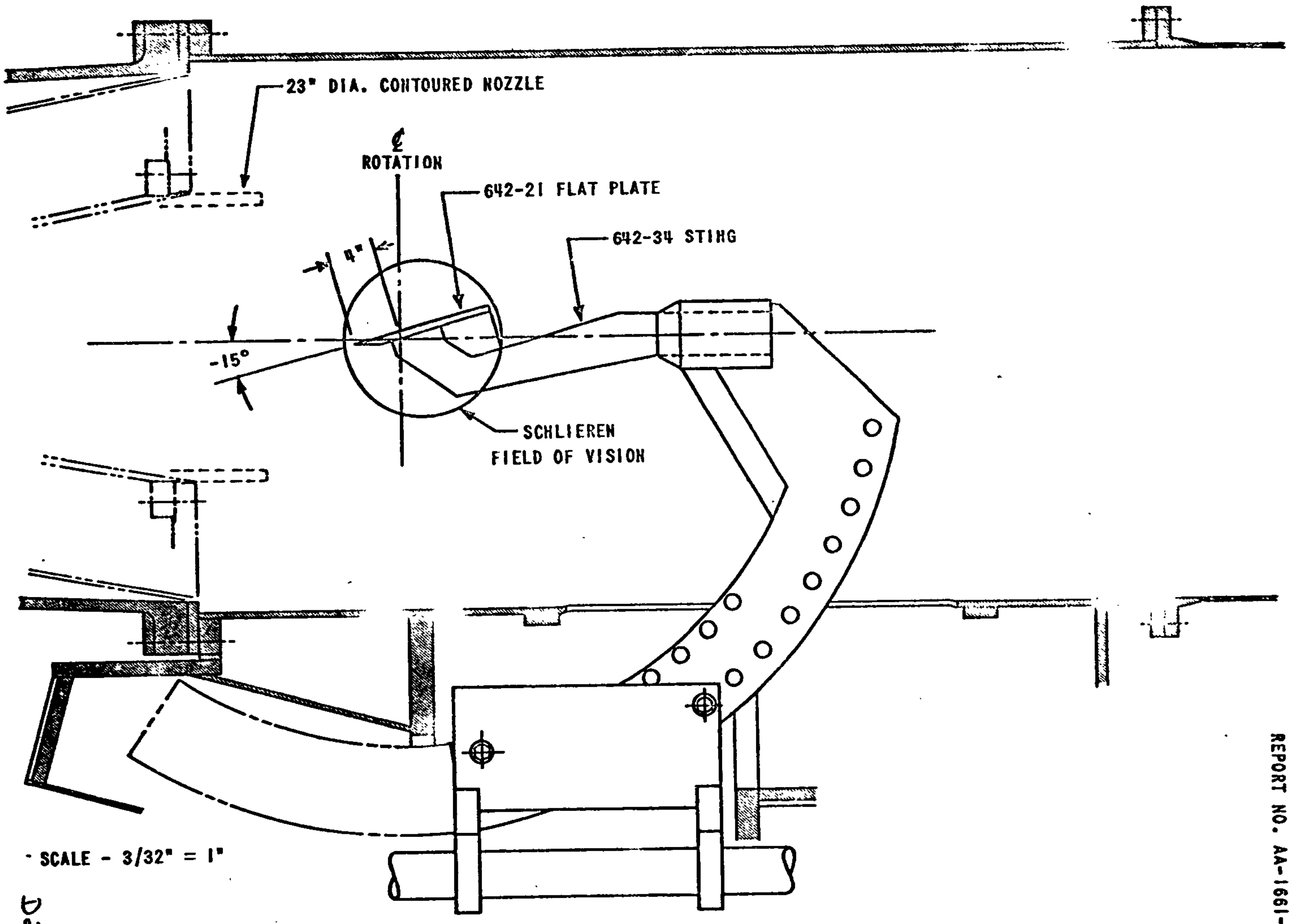
LEADING EDGE MODEL TEST INSTALLATION

Figure 2-A



HEMISPHERE CYLINDER MODEL

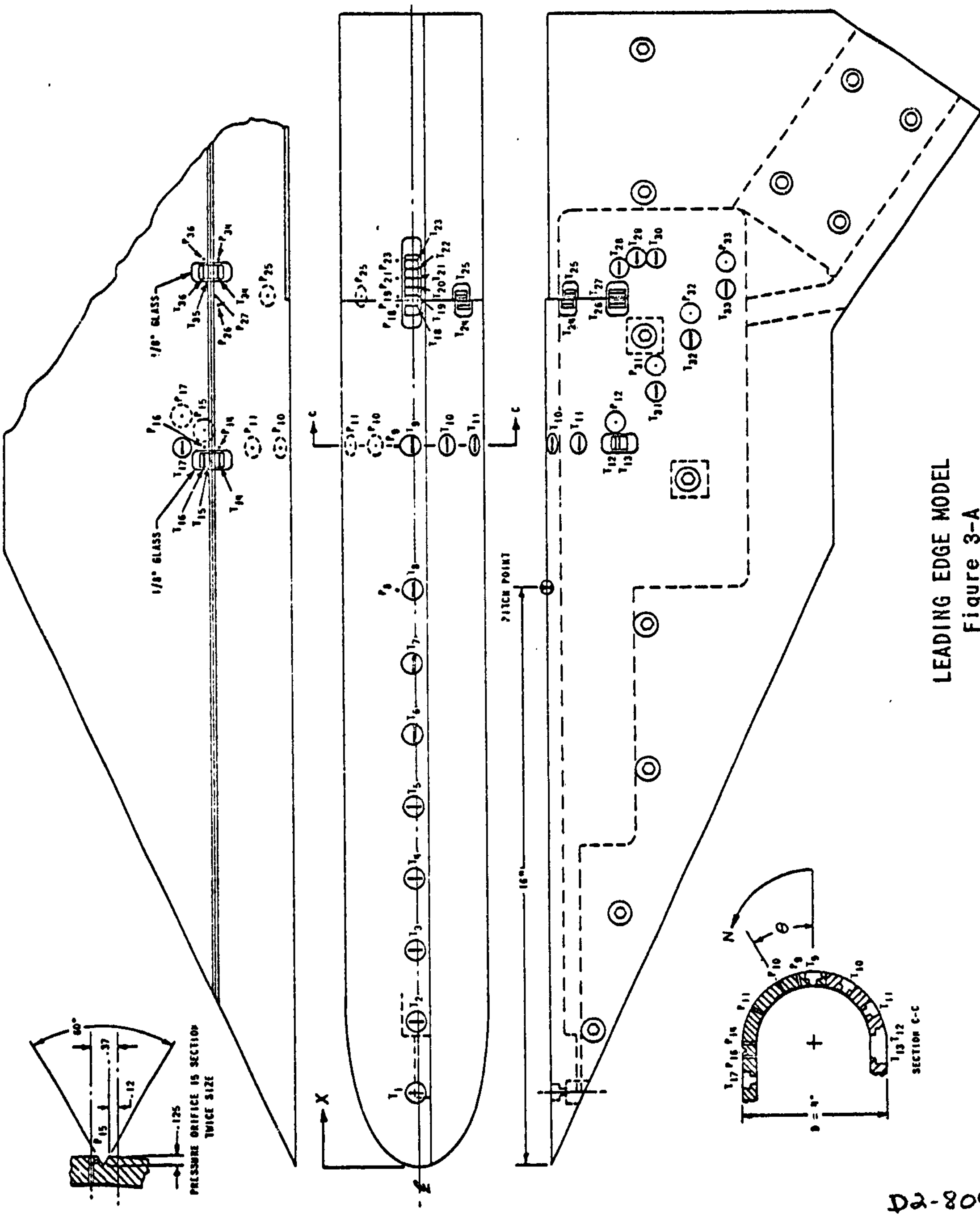
Figure 2-B



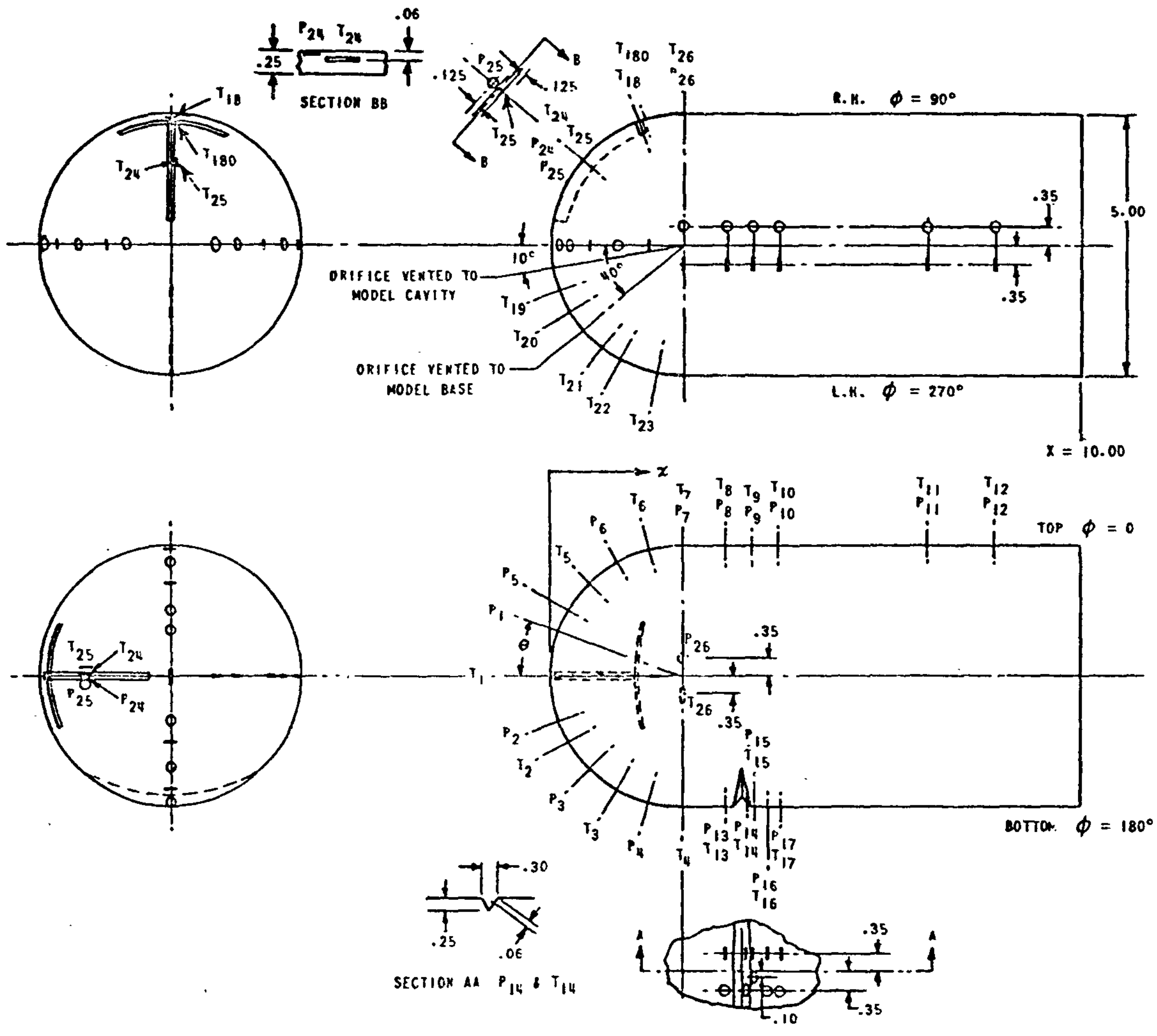
SCALE - 3/32" = 1"

FLAT PLATE MODEL TEST INSTALLATION

Figure 2-C



LEADING EDGE MODEL
Figure 3-A



HEMISPHERE CYLINDER MODEL
Figure 3-B

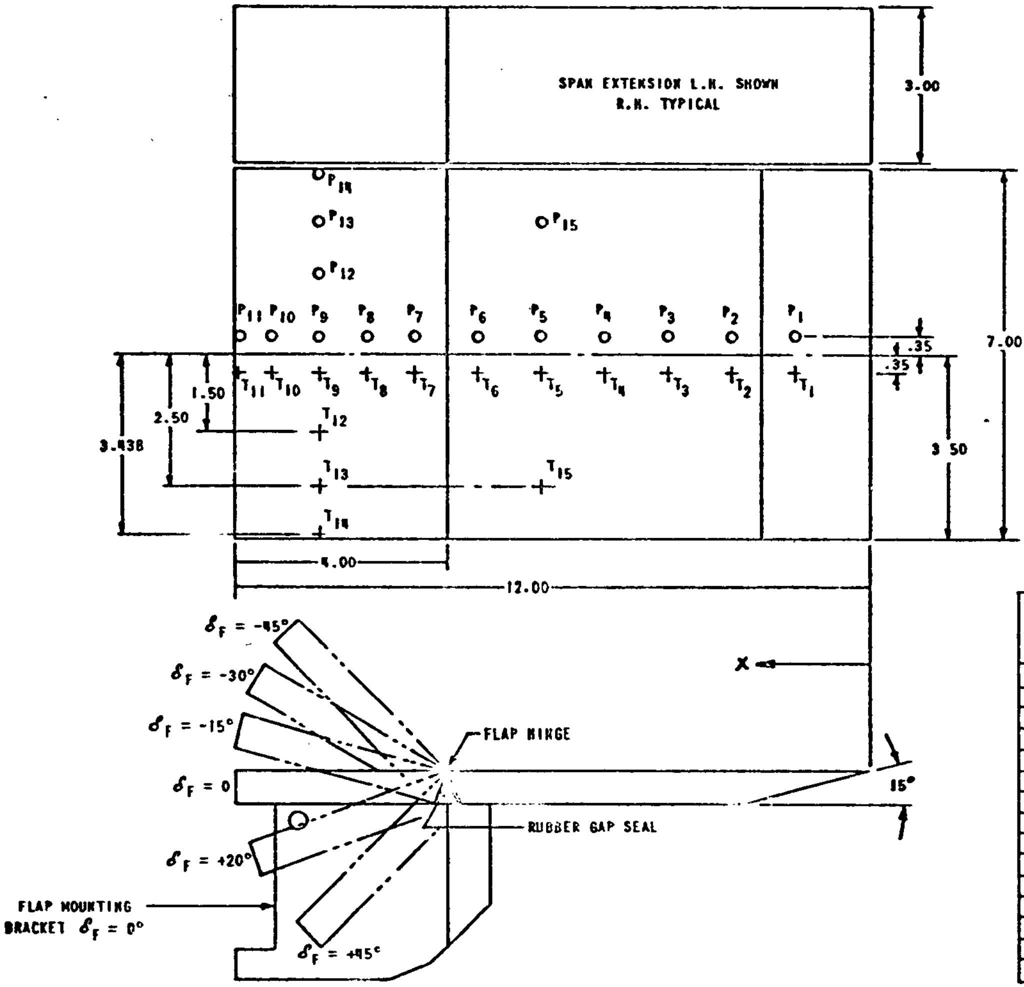
PRESSURE LOCATIONS

PRESS NO.	DEG.	INCHES
1	20°	
2	20°	
3	45°	
4	75°	
5	30°	
6	60°	
7	90°	2.50
8		3.30
9		3.80
10		4.30
11		7.10
12		8.37
13		3.325
14		3.68
15		3.84
16		4.10
17		4.35
24	40°	
25	40°	
26	90°	

W.T. GAGE LOCATIONS

W.T. NO.	DEG.	INCHES
1	0	
2	30	
3	60	
4	90	
5	45	
6	75	
7	90	2.50
8		3.30
9		3.80
10		4.30
11		7.10
12		8.37
13		3.325
14		3.68
15		3.84
16		4.10
17		4.35
18	70	
180	70	
19	20	
20	30	
21	51	
22	61	
23	78	
24	40	
25	40	
26	90	
28	VENT INSIDE MODEL	

39



INSTRUMENTATION AXIAL LOCATIONS

ORIFICE OR GAGE NO.	X INCHES
1	1.42
2	2.62
3	3.82
4	5.02
5	6.22
6	7.42
7	8.60
8	9.50
9	10.40
10	11.30
11	11.936
12	10.40
13	10.40
14	10.40
15	6.22

FLAT PLATE MODEL

Figure 3-C

MODEL PHOTOGRAPH

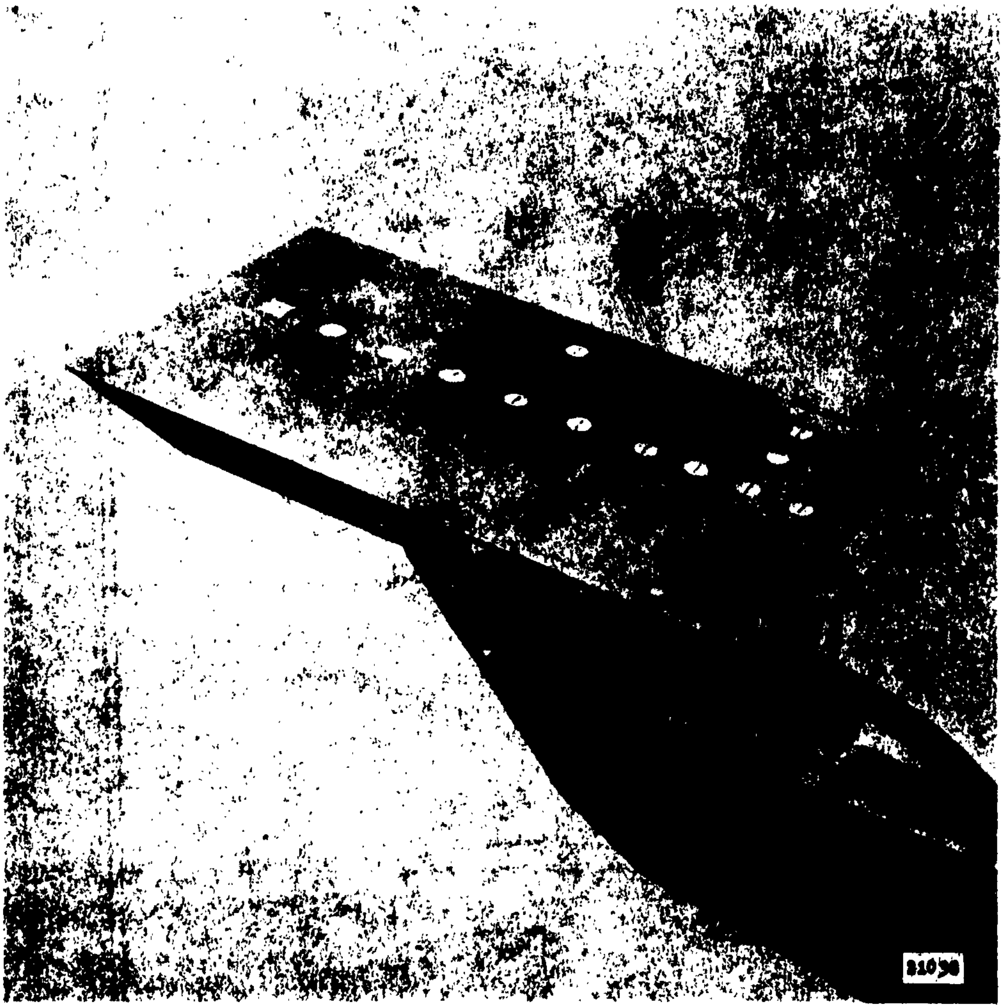
LEADING EDGE MODEL

Figure 4-A

MODEL PHOTOGRAPH

HEMISPHERE CYLINDER MODEL

Figure 4-B



MODEL PHOTOGRAPH

FLAT PLATE MODEL

Figure 4-C

RUN 3406-30

M_∞ = 15.17

λ = 55°

SCHLIEREN PHOTOGRAPH

$R_{N/FT.}$ = 1.21×10^5

LEADING EDGE MODEL

Figure 5-A-1

RUN 3392-16

M_∞ = 6.28

SCHLIEREN PHOTOGRAPH

λ = 55°

$R_{N/FT.}$ = 9.37 x 10^6

LEADING EDGE MODEL

Figure 5-A-2

RUN 3397-21

M_{∞} = 15.48

SCHLIEREN PHOTOGRAPH

λ = 0°

$R_{N/FT.}$ = 2.49 x 10^5

HEMISPHERE CYLINDER MODEL

Figure 5-B-1

RUN 3454-69

$M_\infty = 6.40$

SCHLIEREN PHOTOGRAPH

$\alpha = 0°$

$R_N/FT. = 14.37 \times 10^6$

HEMISPHERE CYLINDER MODEL

Figure 5-B-2

RUN 3435-40

$M_\infty = 15.15$

$R_{N/FT.} = 1.15 \times 10^5$

SCHLIEREN PHOTOGRAPH

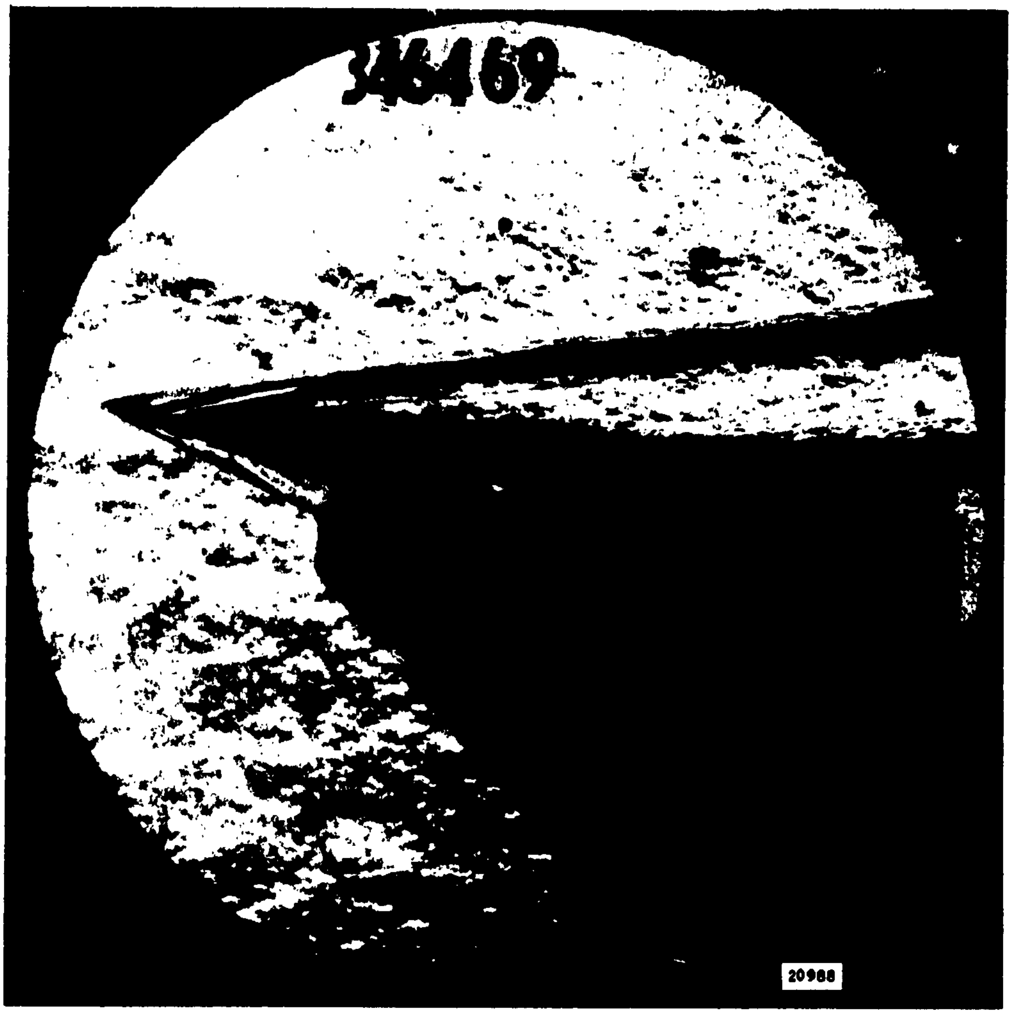
FLAT PLATE MODEL

$\alpha = 0°$

$\delta_F = 0°$

Figure 5-C-1

D2 80910



RUN 3464-69

M_{∞} = 6.38

$R_{N/FT.}$ = 13.57×10^6

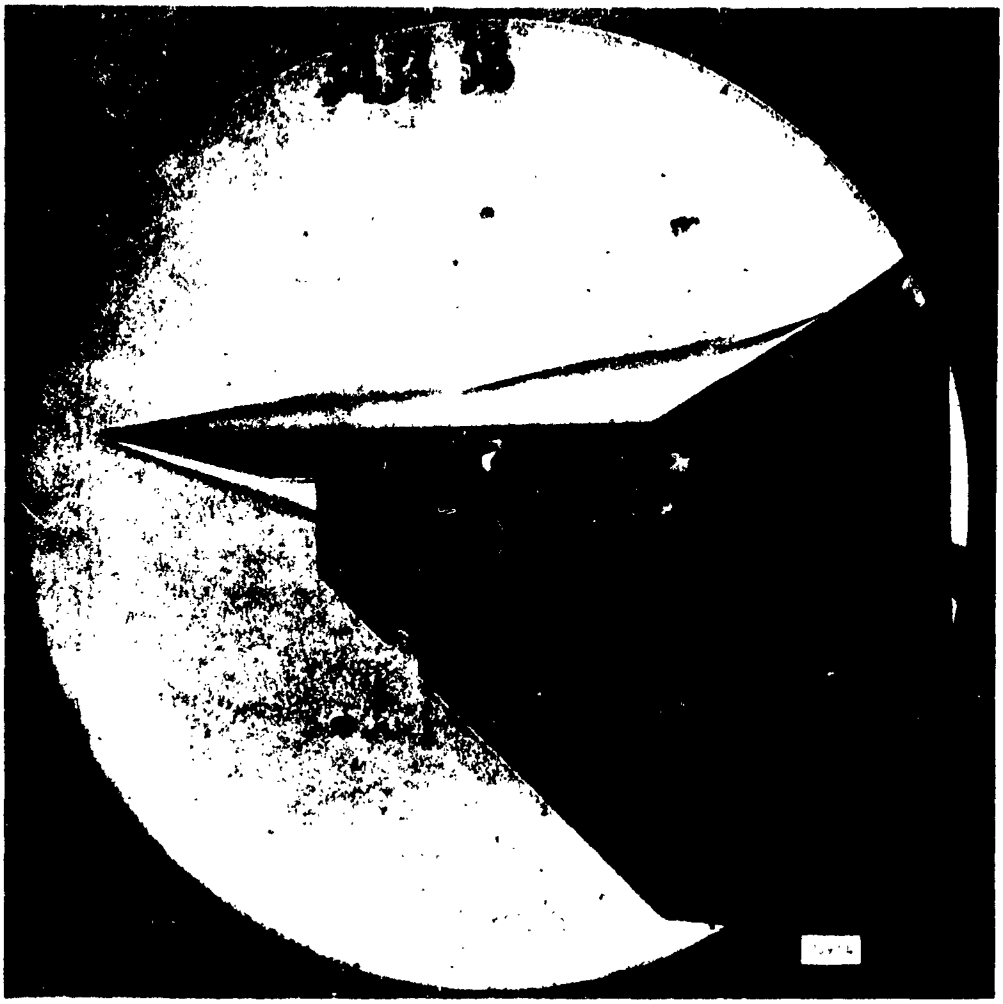
SCHLIEREN PHOTOGRAPH

FLAT PLATE MODEL

$\alpha = 0°$

$\delta_F = 0°$

Figure 5-C-2



RUN 3433-38

M_∞ 15.12

R_N/FT. 1.15×10^5

SCHLIEREN PHOTOGRAPH

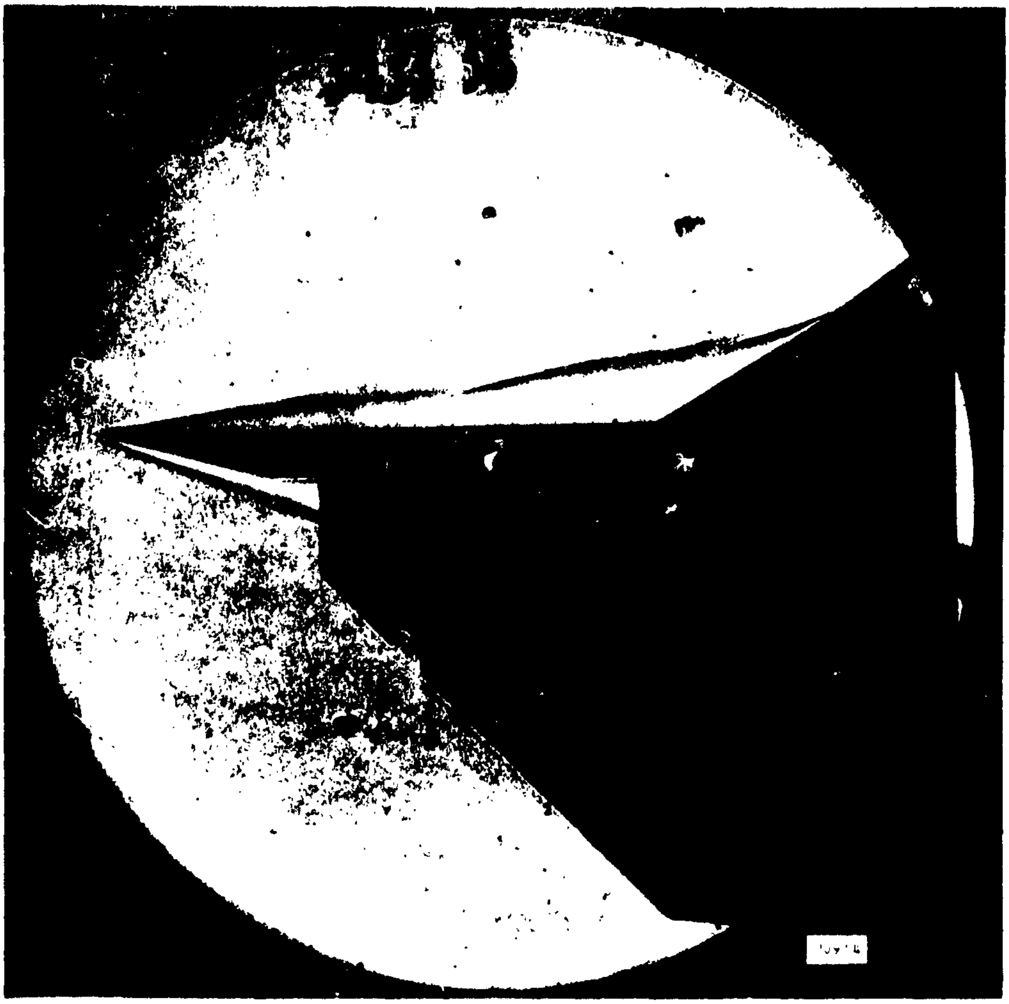
FLAT PLATE MODEL

α 0°

δ_F = -30°

Figure 5-C-3

DR 20910



RUN 3433-38

M_∞ = 15.12

R_N/FT. 1.15 x 10^5

SCHLIEREN PHOTOGRAPH

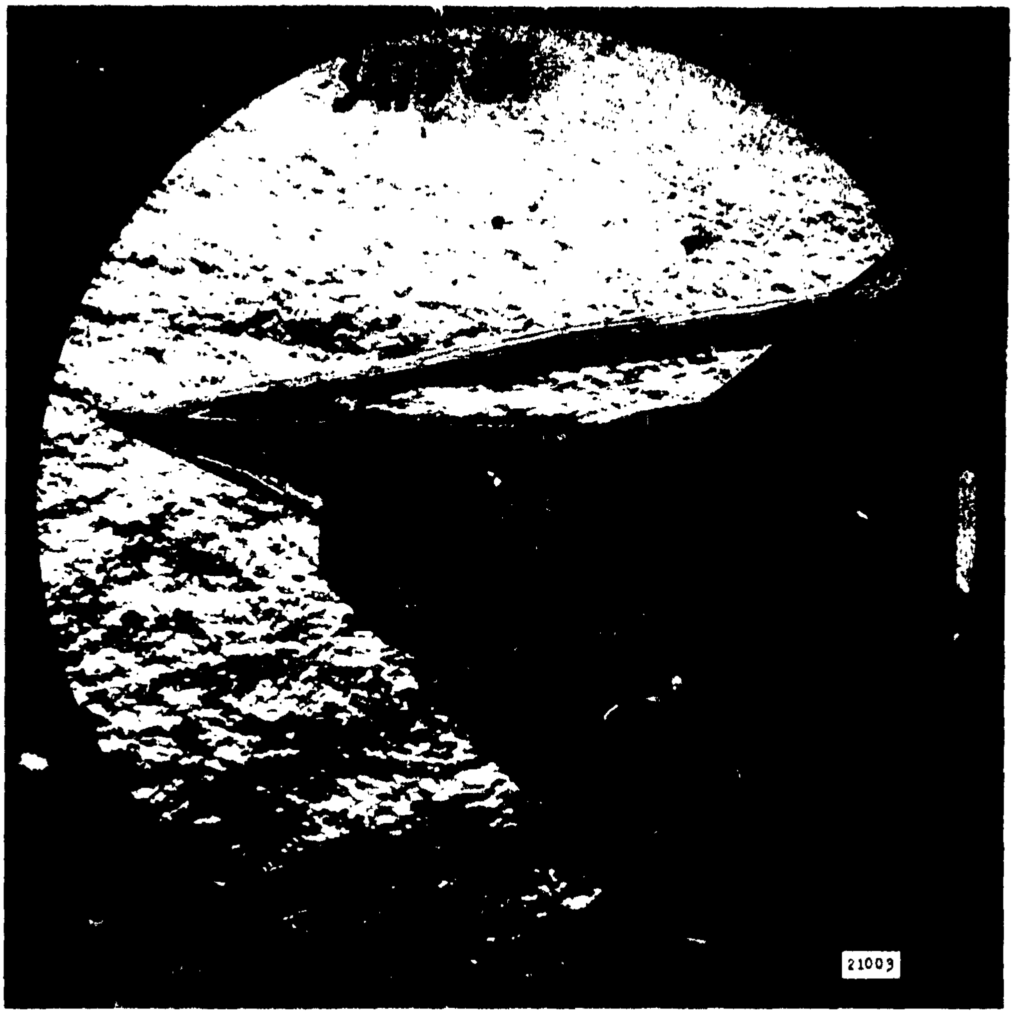
FLAT PLATE MODEL

α = 0°

δ_F = -30°

Figure 5-C-3

DA 80910



RUN 3479-84

$M = 6.38$

$R_N/FT. = 14.09 \times 10^6$

SCHLIEREN PHOTOGRAPH

FLAT PLATE MODEL

$\alpha = 0°$

$\delta_F = -30°$

Figure 5-C-4

PRESSURE AND HEAT TRANSFER

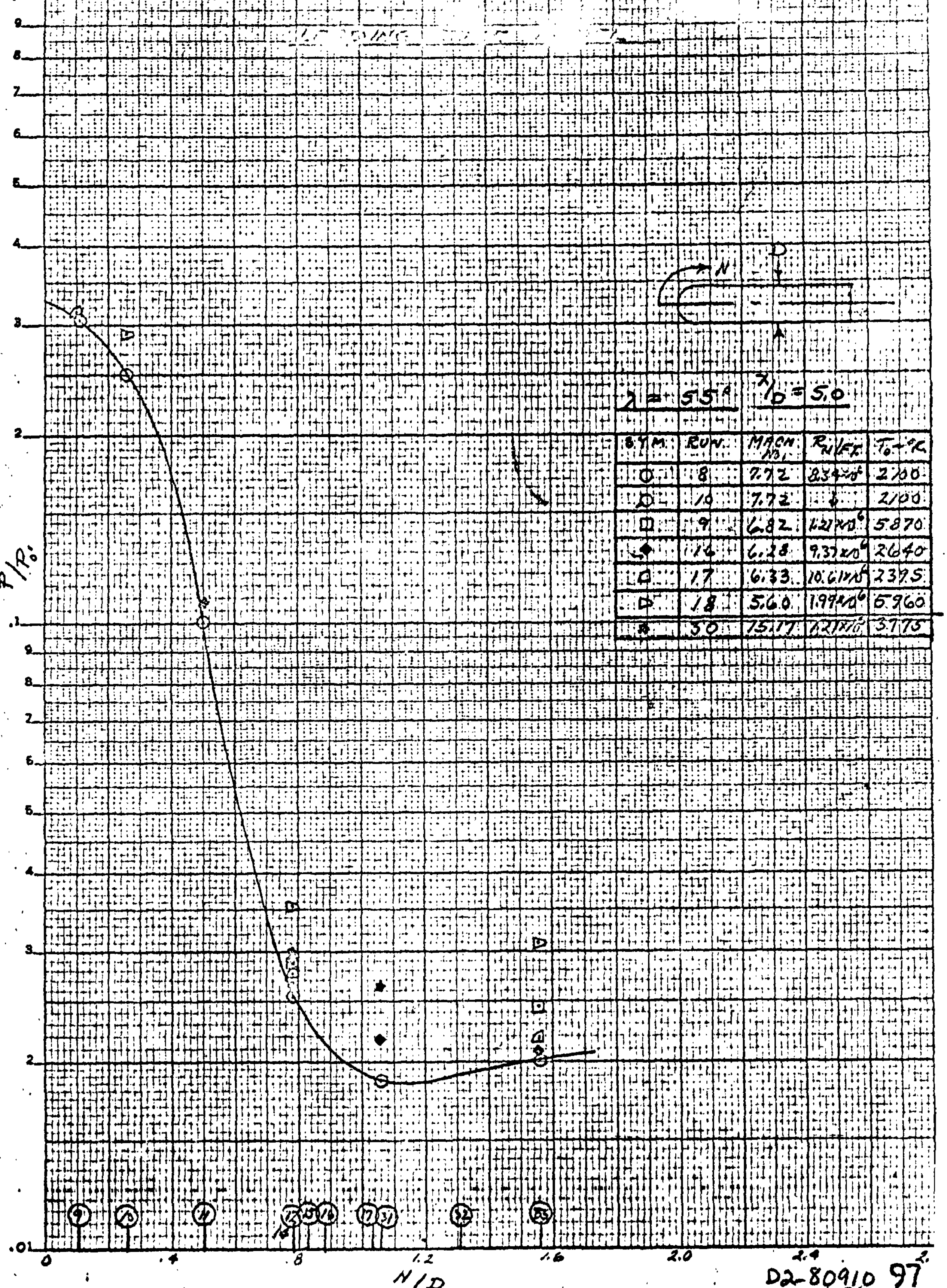
DISTRIBUTIONS

OVER A BLUNT LEADING EDGE

$\lambda = 55°$

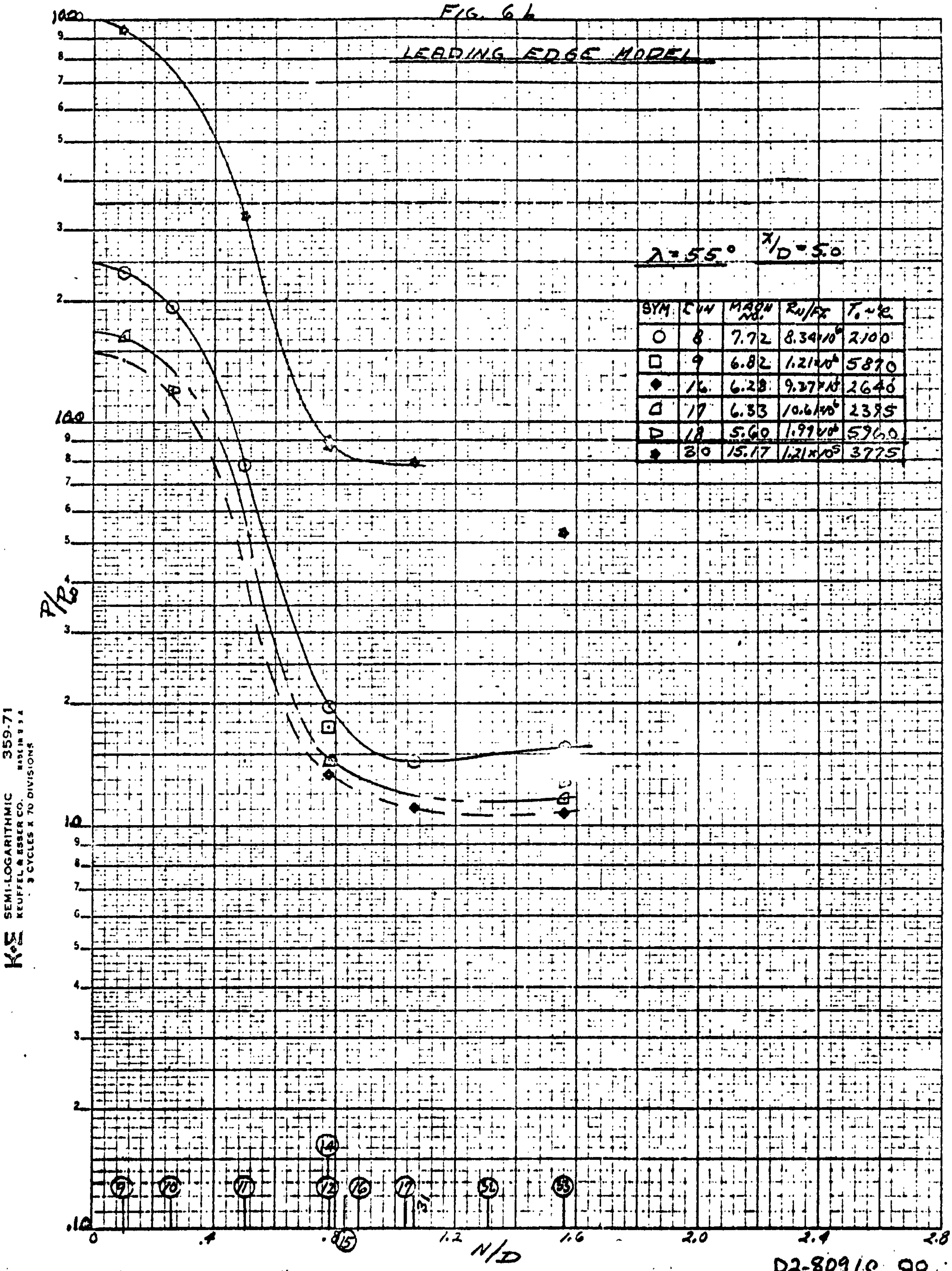
FIGURE 6

FIG. 6a



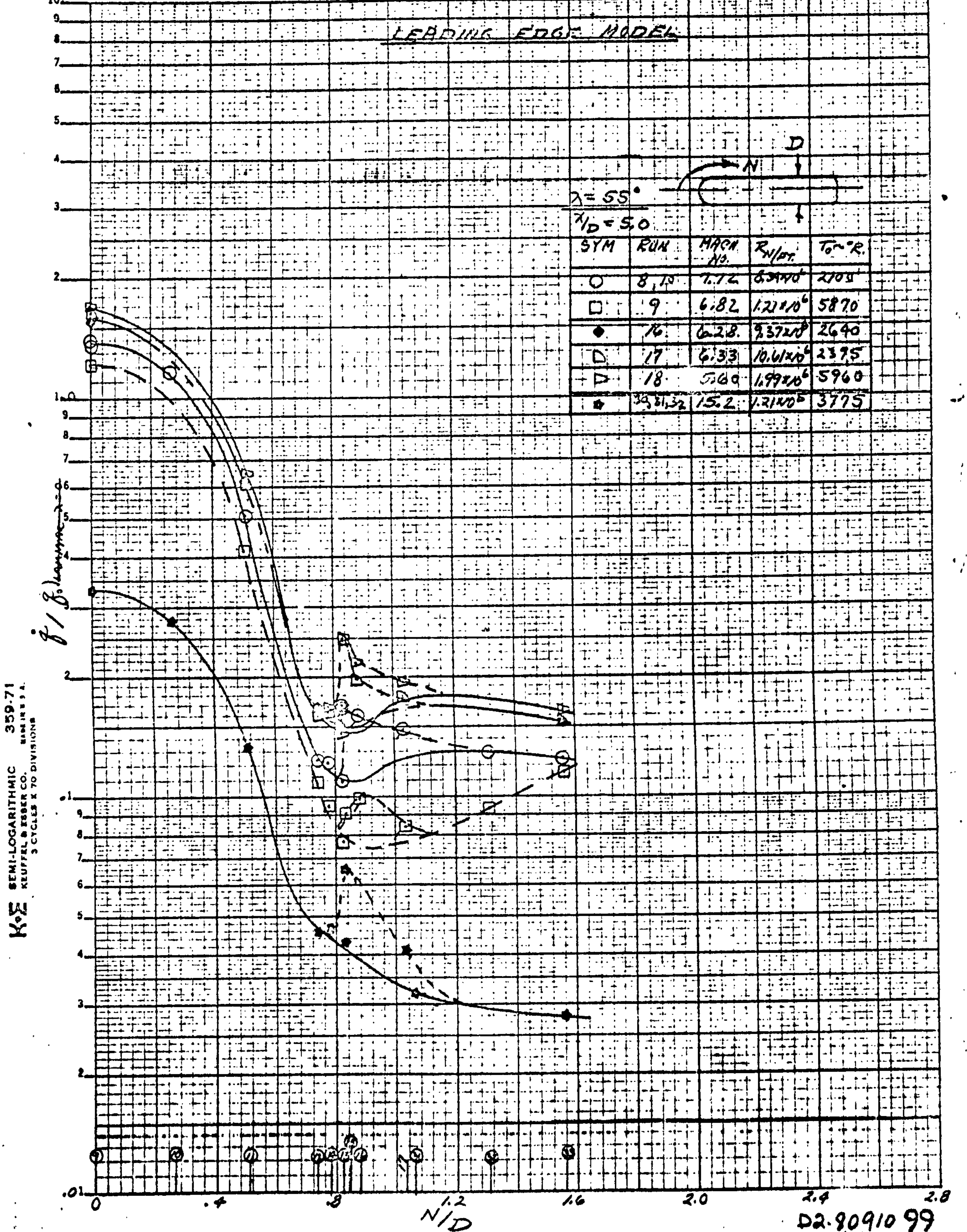
N
D
λ = 55°
x/D = 5.0
SYM. RUN. MACH NO. R_N/FT. T_0-°R
8 7.72 8.34×10⁶ 2100
10 7.72 2100
9 6.82 1.21×10⁶ 5870
16 6.28 9.37×10⁶ 2640
17 6.33 10.61×10⁶ 2395
18 5.60 1.99×10⁶ 5960
30 15.17 1.21×10⁶ 3775
P/P₀'
N/D

FIG. 6b



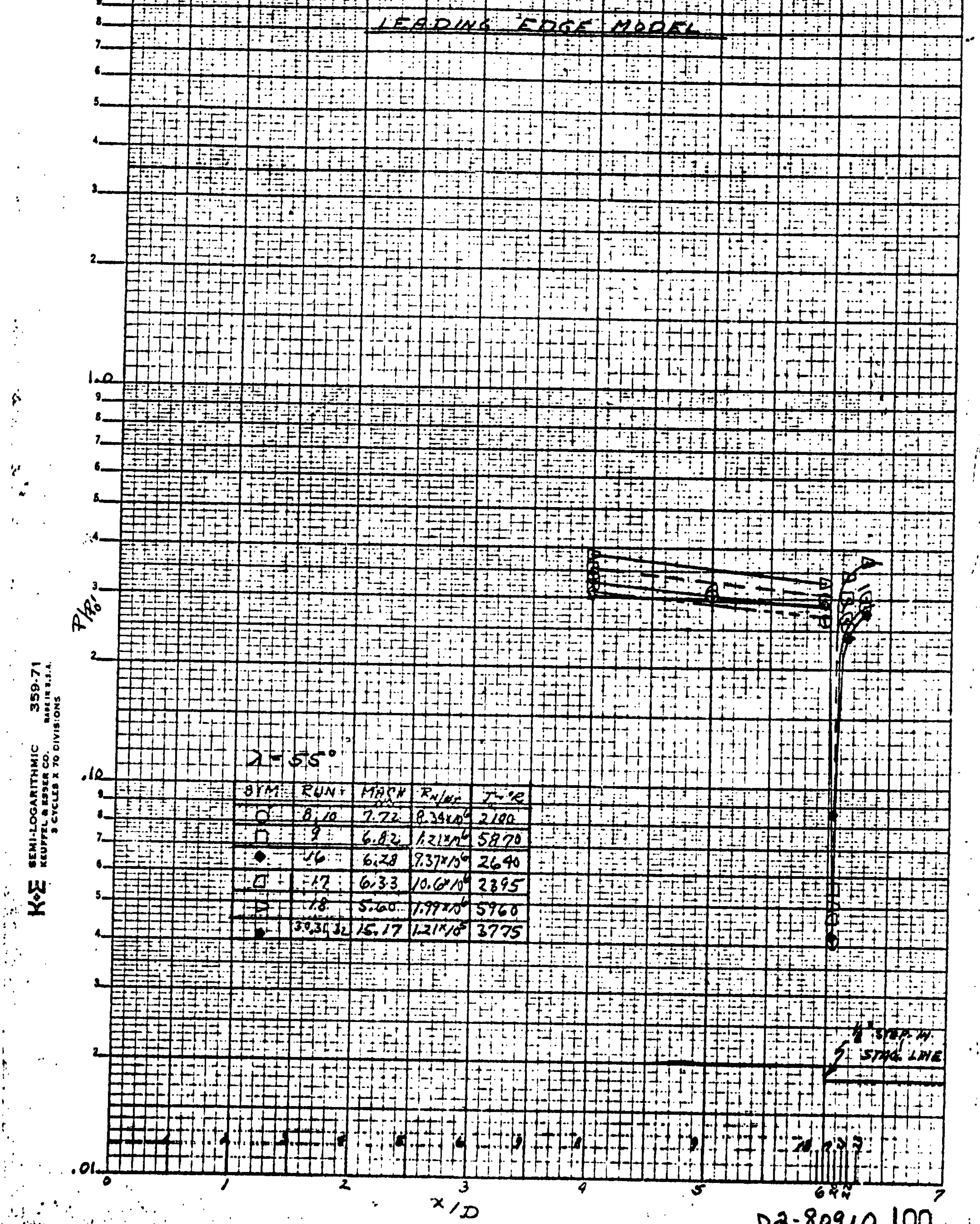
SYM	r IN	MACH NO.	RN/FT	T0 ~ °R
○	8	7.72	8.34×10^6	2100
□	9	6.82	1.21×10^6	5870
◆	16	6.28	9.37×10^6	2646
◻	17	6.33	10.6×10^6	2395
▷	18	5.60	1.99×10^6	5960
◆	30	15.17	1.21×10^5	3775

FIG. 6C



D2-90910 99

FIG. 6d.


LEADING EDGE MODEL
P/P0'
x/D
λ = 55°
SYM RUN MACH RN/in T0 °R
○ 8,10 7.72 8.34x10^6 2100
□ 9 6.82 1.21x10^6 5870
◆ 16 6.28 9.37x10^6 2640
◻ 17 6.33 10.6x10^6 2895
▷ 18 5.60 1.99x10^6 5960
● 30,31,32 15.17 1.21x10^5 3775
1/8" STEP IN STAG. LINE
K+E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

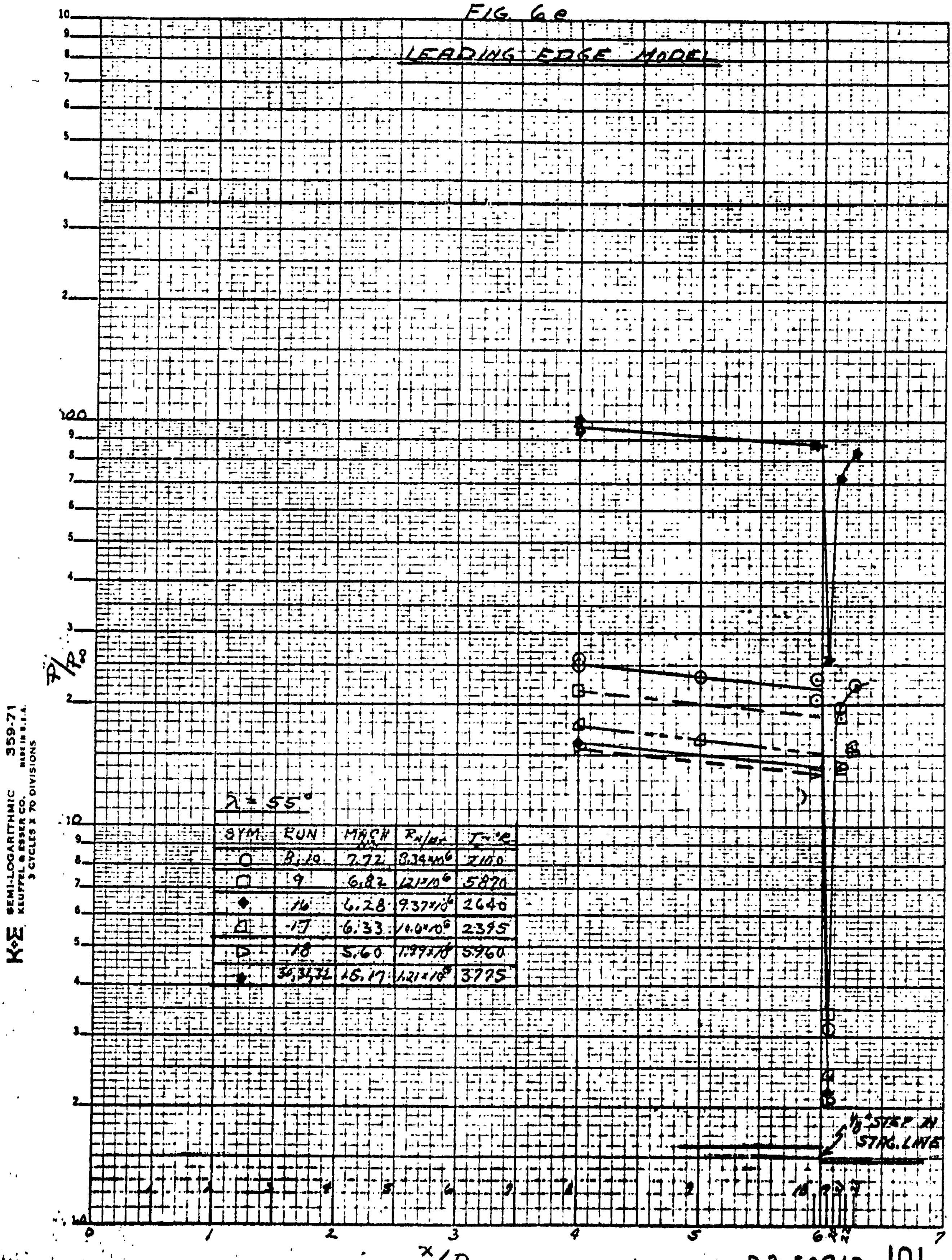
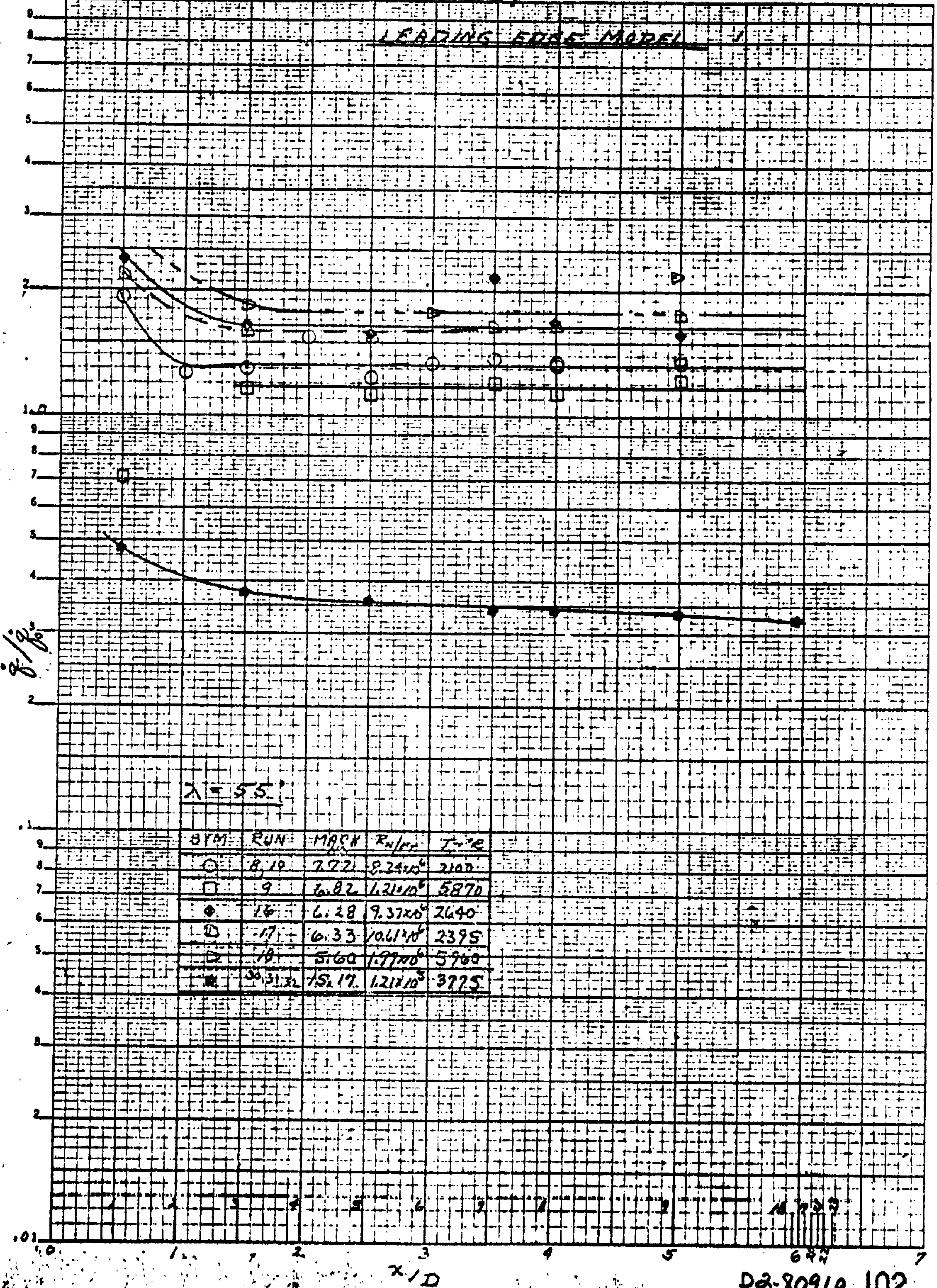


FIG. 6e
LEADING EDGE MODEL
λ = 55°
SYM. RUN MACH R_N/ft T ~ °R
○ 8,10 7.72 3.34×10⁶ 2100
□ 9 6.82 1.21×10⁶ 5870
◆ 16 6.28 9.37×10⁶ 2640
△ 17 6.33 10.0×10⁶ 2395
▷ 18 5.60 1.99×10⁶ 5960
● 30,31,32 16.17 1.21×10⁶ 3775
P/P∞
x/D
1/8" STEP IN STAG. LINE
K&E SEMI-LOGARITHMIC 359-71 KEUFFEL & ESSER CO. MADE IN U.S.A. 3 CYCLES X 70 DIVISIONS

FIG. 6F.



K+E SEMI-LOGARITHMIC 359-71 KEUFFEL & ESSER CO. MADE IN U.S.A. 3 CYCLES X 70 DIVISIONS

FIG. 6.g

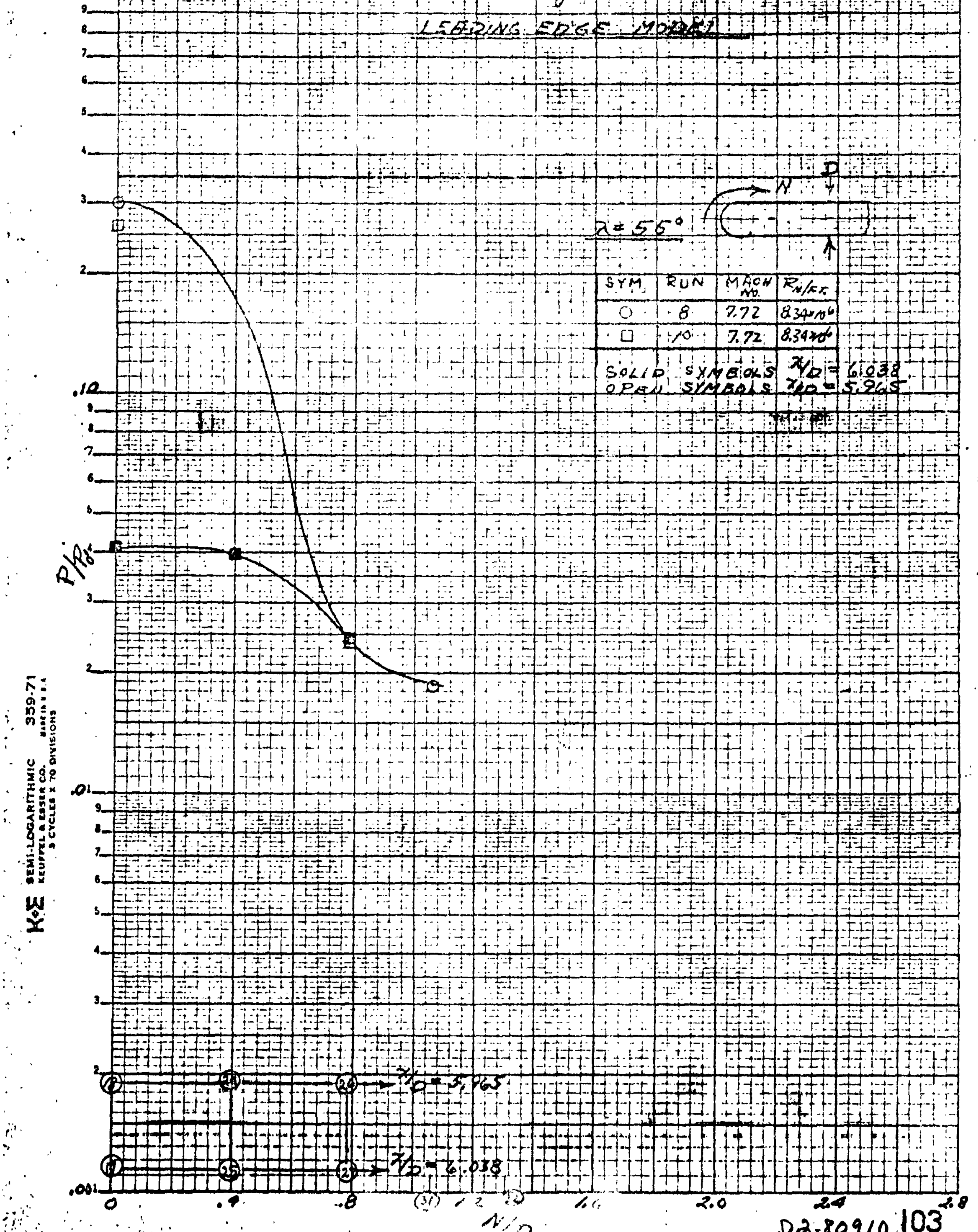
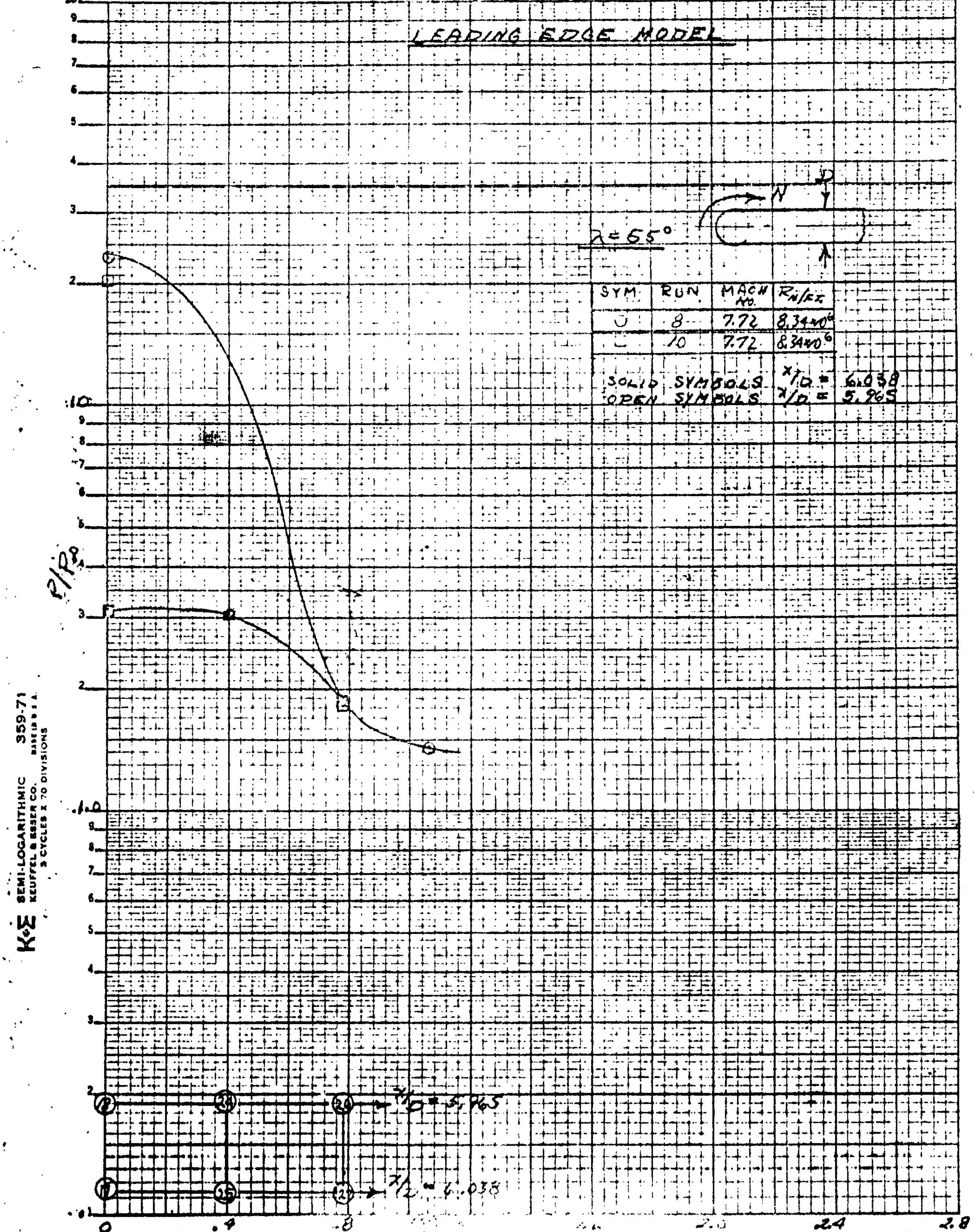
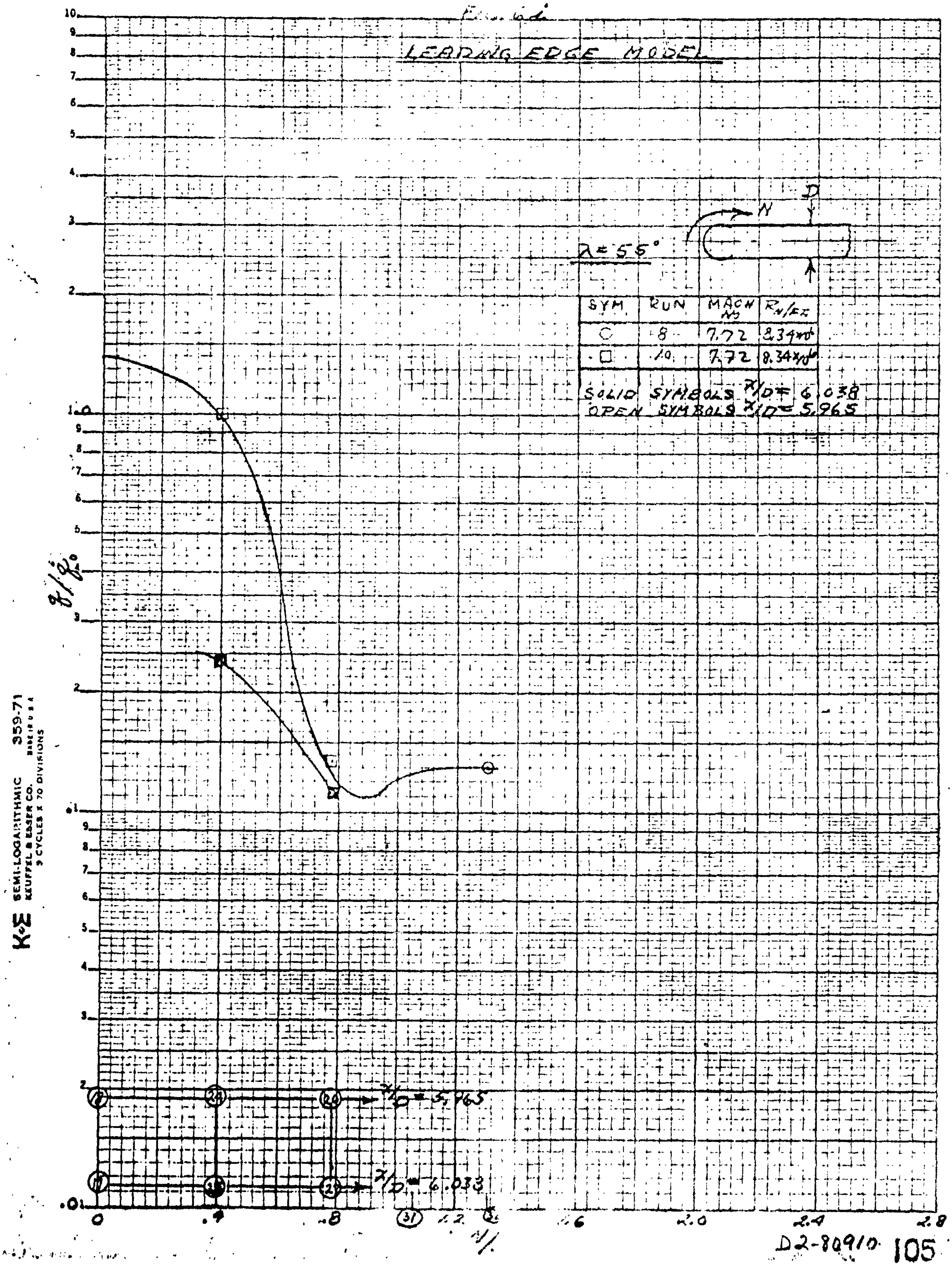

LEADING EDGE MODEL
α = 55°
N
D
SYM RUN MACH NO. R_N/FT.
○ 8 7.72 8.34×10⁶
□ 10 7.72 8.34×10⁶
SOLID SYMBOLS X/D = 6.038
OPEN SYMBOLS X/D = 5.965
P/P₀
X/D = 5.965
X/D = 6.038
N/D
0 .4 .8 1.2 1.6 2.0 2.4 2.8
1.0 .10 .01 .001
K&E SEMI-LOGARITHMIC 359-71 KEUFFEL & ESSER CO. 3 CYCLES X 70 DIVISIONS

FIG. 6h

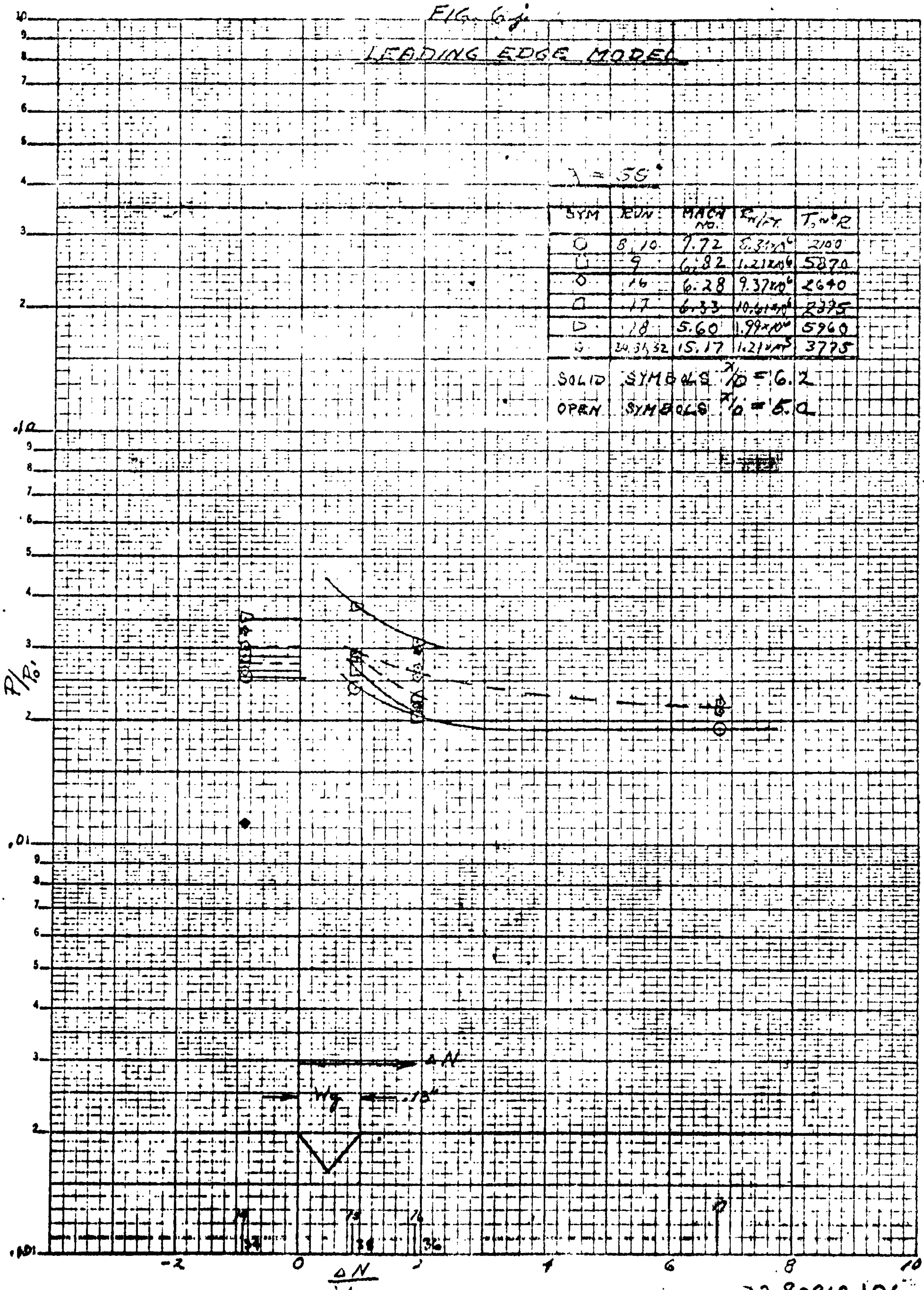

LEADING EDGE MODEL
λ = 65°
N
D
SYM RUN MACH NO. RN/FT.
8 7.72 8.34×10^6
10 7.72 8.34×10^6
SOLID SYMBOLS x/D = 6.038
OPEN SYMBOLS x/D = 5.965
P/P∞
x/D = 5.965
x/D = 6.038
0
.4
.8
2.4
2.8
K&E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS



LEADING EDGE MODEL
Λ = 55°
N
D
SYM
RUN
MACH NO
R_N/FT
○
8
7.72
8.34×10^6
□
10
7.72
8.34×10^6
SOLID SYMBOLS X/D = 6.038
OPEN SYMBOLS X/D = 5.965
q/q_0
X/D = 5.965
X/D = 6.033
0
.4
.8
1.2
1.6
2.0
2.4
2.8
K&E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

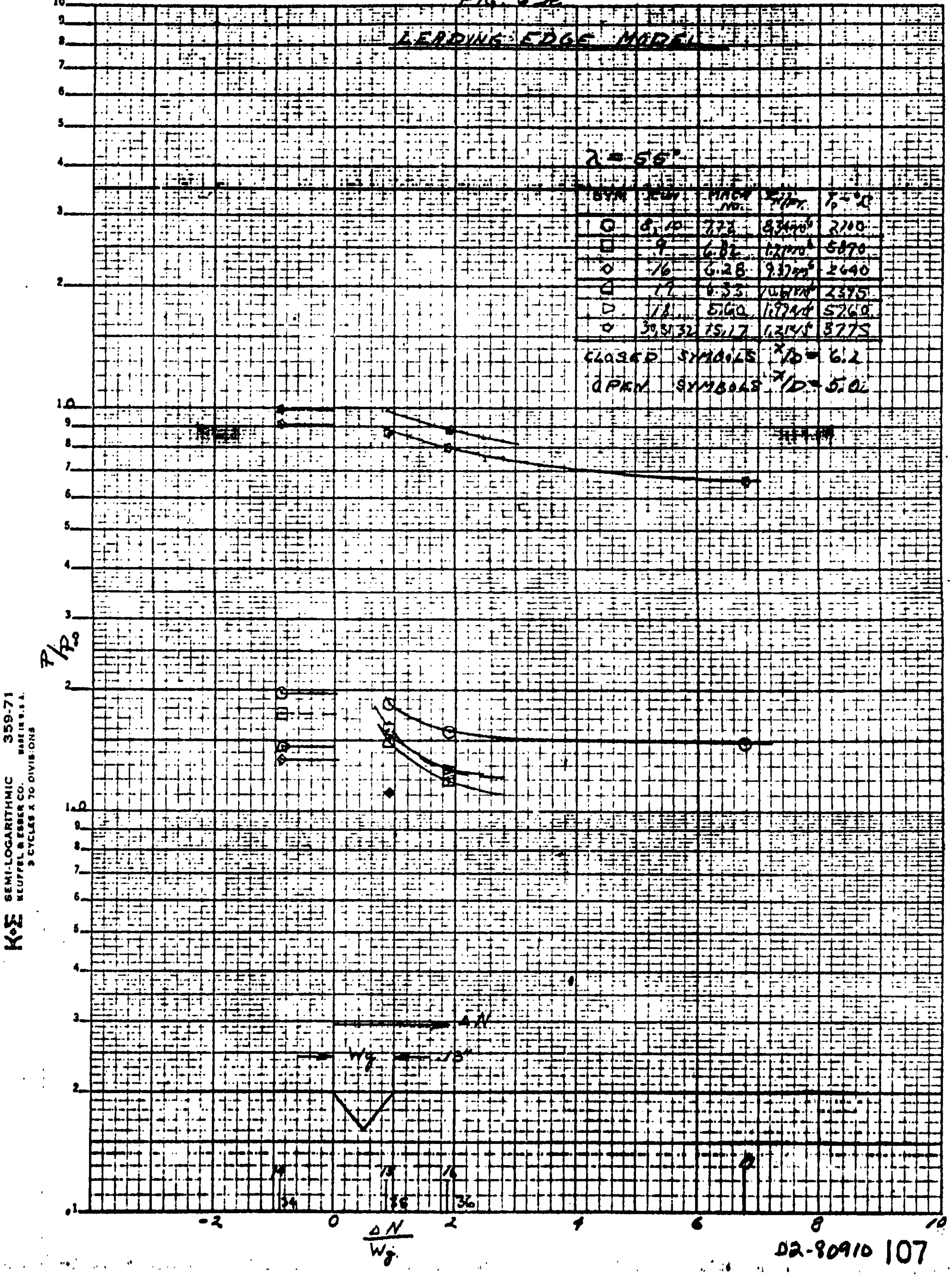
FIG. 6j

LEADING EDGE MODEL



SYM	RUN	MACH NO.	R_N/FT	T_0 °R
○	8, 10	7.72	8.31×10^6	2100
□	9	6.82	1.21×10^6	5870
◇	16	6.28	9.37×10^6	2640
	17	6.33	10.61×10^6	2375
▷	18	5.60	1.99×10^6	5960
	34, 35, 32	15.17	1.21×10^5	3775

FIG. 6k



LEADING EDGE MODEL
λ = 56°
SYM
MACH NO.
T_p °R
8, 10 7.72 2100
9 6.82 5890
16 6.28 2640
17 6.33 2395
18 5.60 5760
30, 31, 32 15.17 3775
CLOSED SYMBOLS X/D = 6.2
OPEN SYMBOLS X/D = 5.0
P/P₀
ΔN
Wj = 13"
ΔN/Wj
-2
0
2
4
6
8
10
KE SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

FIG. 62

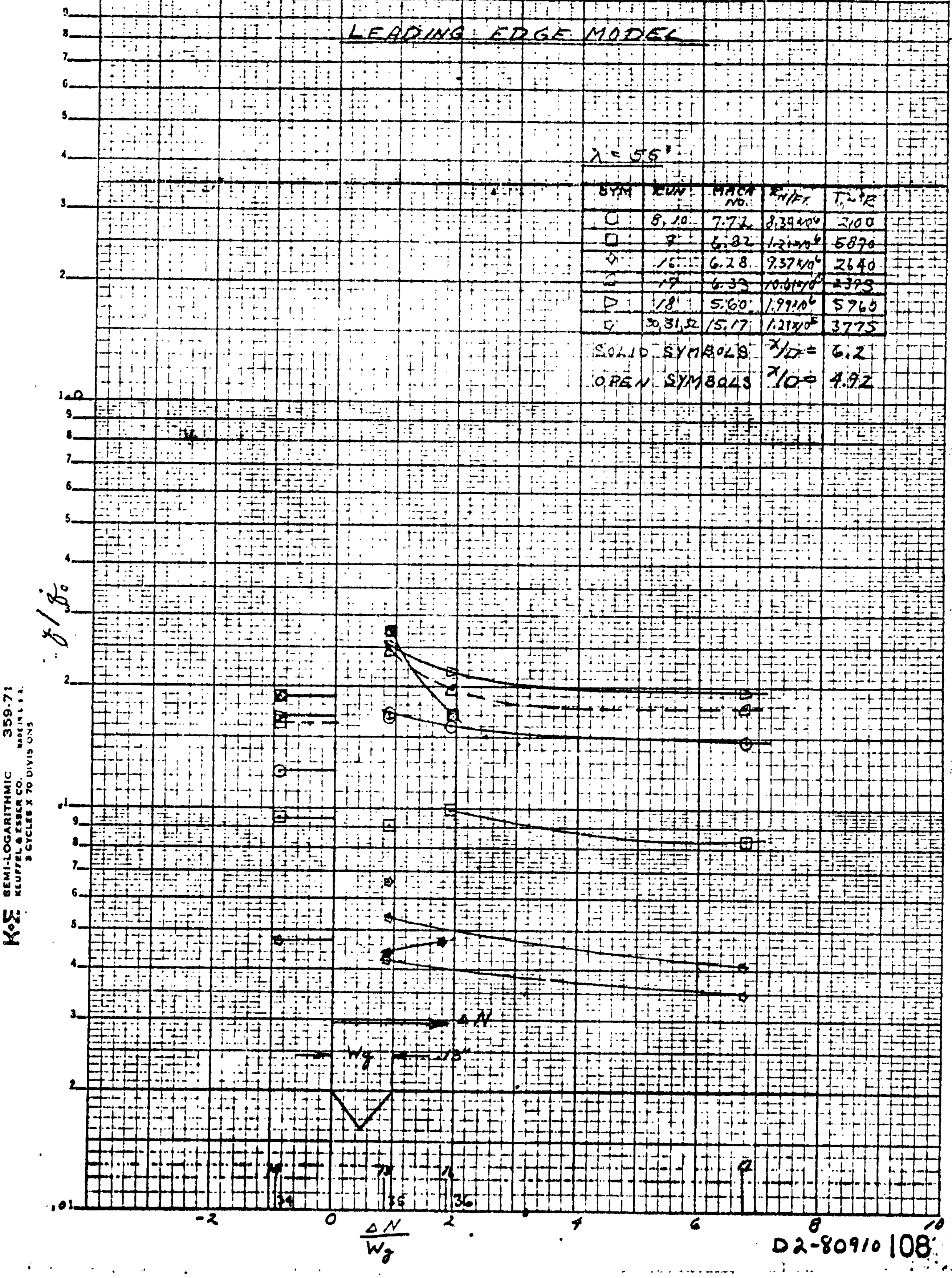
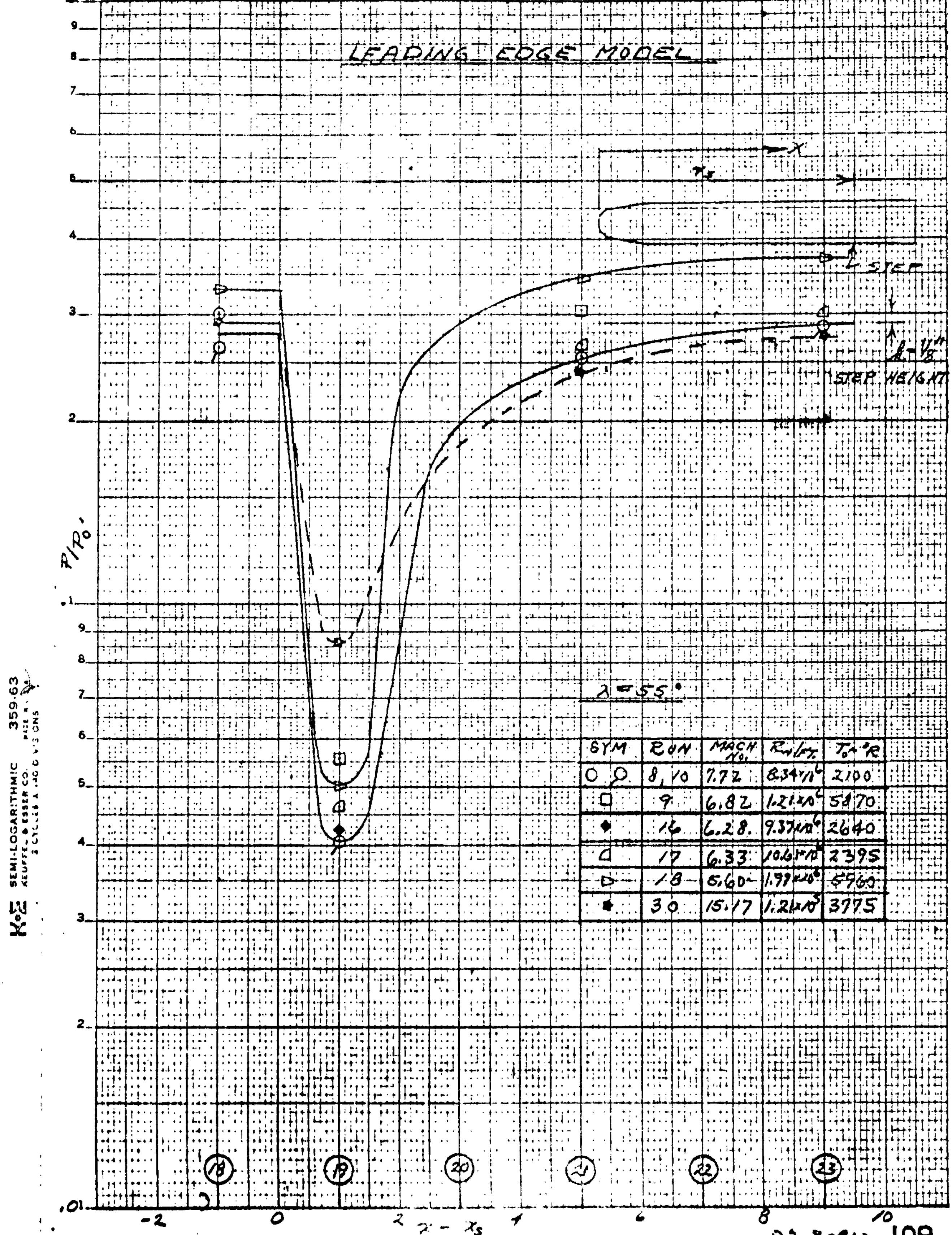
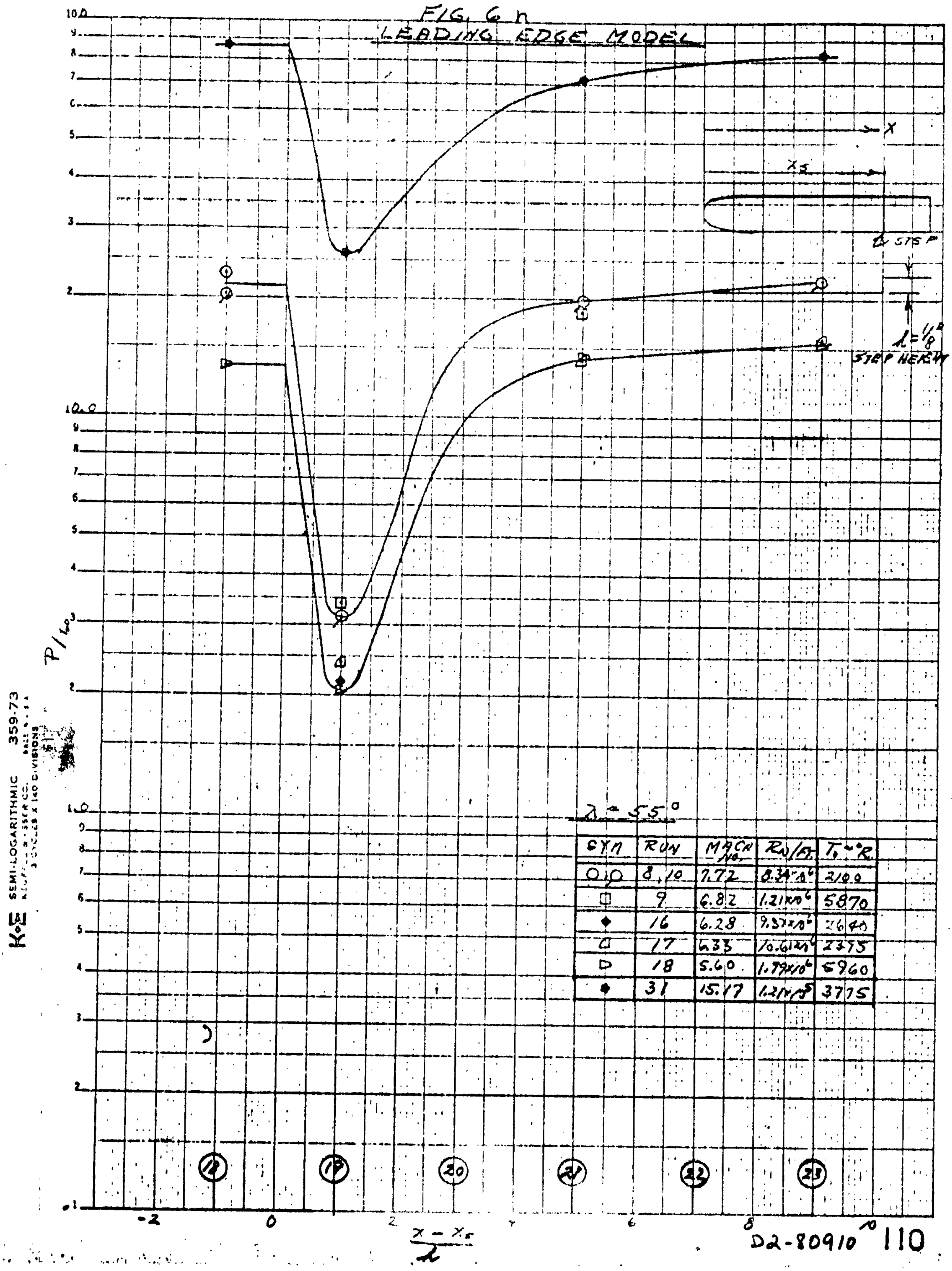

LEADING EDGE MODEL
λ = 56°
SYM | RUN | MACH NO. | R N/FT | T₀ ~ °R
8, 10 | 7.72 | 8.39×10⁶ | 2100
7 | 6.82 | 1.21×10⁶ | 5870
16 | 6.28 | 9.37×10⁶ | 2640
17 | 6.33 | 10.61×10⁶ | 2393
18 | 5.60 | 1.99×10⁶ | 5760
30, 31, 32 | 15.17 | 1.21×10⁵ | 3775
SOLID SYMBOLS x/D = 6.2
OPEN SYMBOLS x/D = 4.92
ΔN
Wg
.15"
34
35
36
-2
0
2
4
6
8
10
ΔN/Wg

FIG. 6 m


LEADING EDGE MODEL
x
x_s
STEP
$h = 1/8''$
STEP HEIGHT
$\lambda = 55°$
SYM RUN MACH NO. R_N/FT. T_0 °R
8, 10 7.72 8.34×10^6 2100
9 6.82 1.21×10^6 5170
16 6.28 9.37×10^6 2640
17 6.33 10.6×10^6 2395
18 5.60 1.99×10^6 5960
30 15.17 1.21×10^6 3775
P/P_0'
$\frac{x - x_s}{h}$
18
19
20
21
22
23
KE SEMI-LOGARITHMIC 359-63
KEUFFEL & ESSER CO.



SYM	RUN	MACH NO.	R_N/FT.	T_0 ~ °R
○ ◌	8, 10	7.72	8.34×10^6	2100
□	9	6.82	1.21×10^6	5870
◆	16	6.28	9.37×10^6	2640
◻	17	6.35	10.61×10^6	2375
▷	18	5.60	1.79×10^6	5960
◆	31	15.17	1.21×10^5	3775

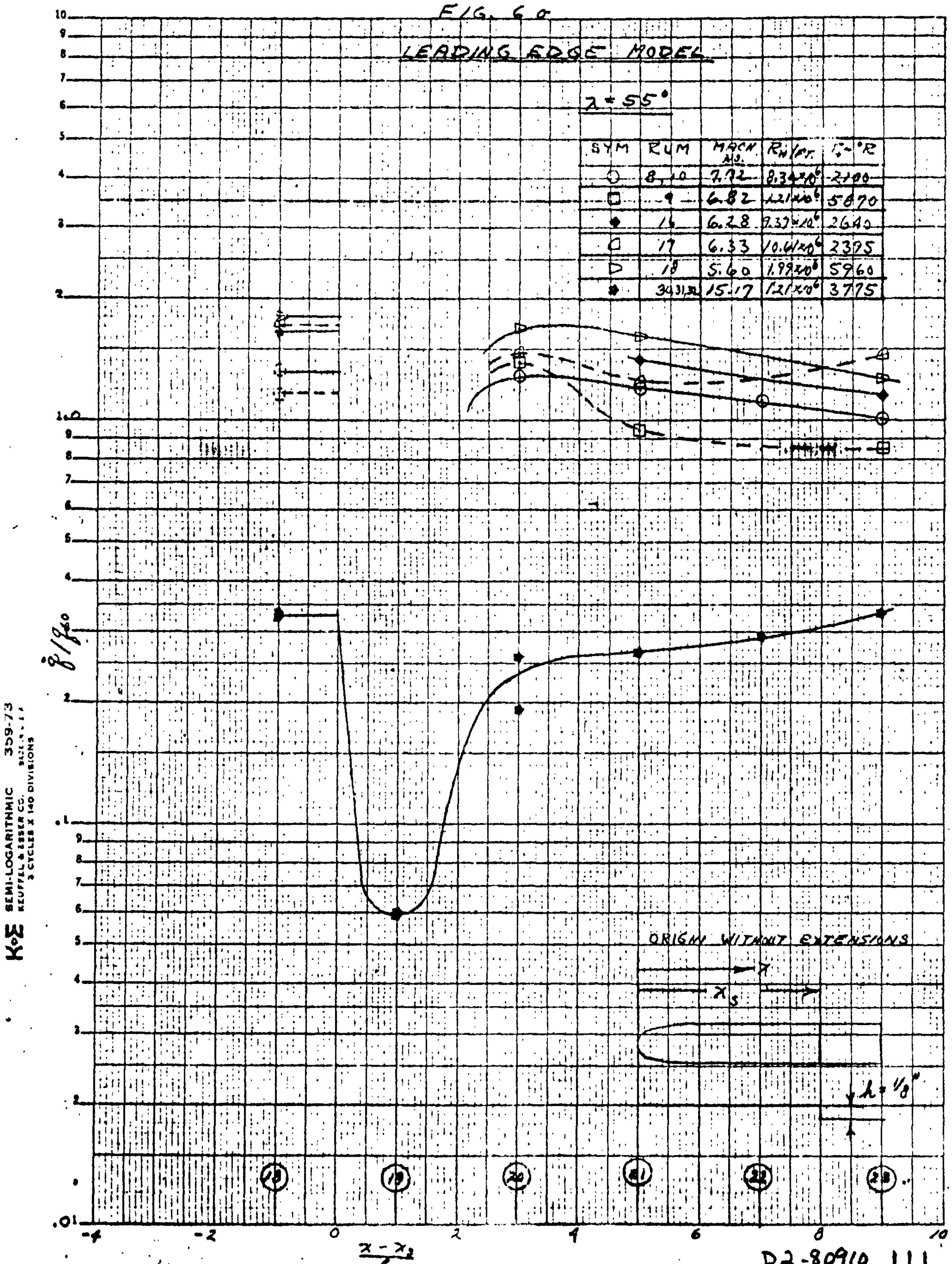


FIG. 60
LEADING EDGE MODEL
λ = 55°
SYM RUN MACH NO. R_N/FT. T_t - °R
○ 8,10 7.72 8.34×10^6 2100
□ 9 6.82 1.21×10^6 5870
◆ 16 6.28 9.37×10^6 2640
⌂ 17 6.33 10.61×10^6 2375
▷ 18 5.60 1.99×10^6 5960
✱ 34,31,32 15.17 1.21×10^6 3775
q/q_so
ORIGIN WITHOUT EXTENSIONS
x_s
h = 1/8"
18
19
20
21
22
23
(x - x_s)/h
K&E SEMI-LOGARITHMIC 359-73
KEUFFEL & ESSER CO.
3 CYCLES X 140 DIVISIONS

PRESSURE AND HEAT TRANSFER

DISTRIBUTIONS

OVER A BLUNT LEADING EDGE

$\lambda = 60^\circ$

FIGURE 7

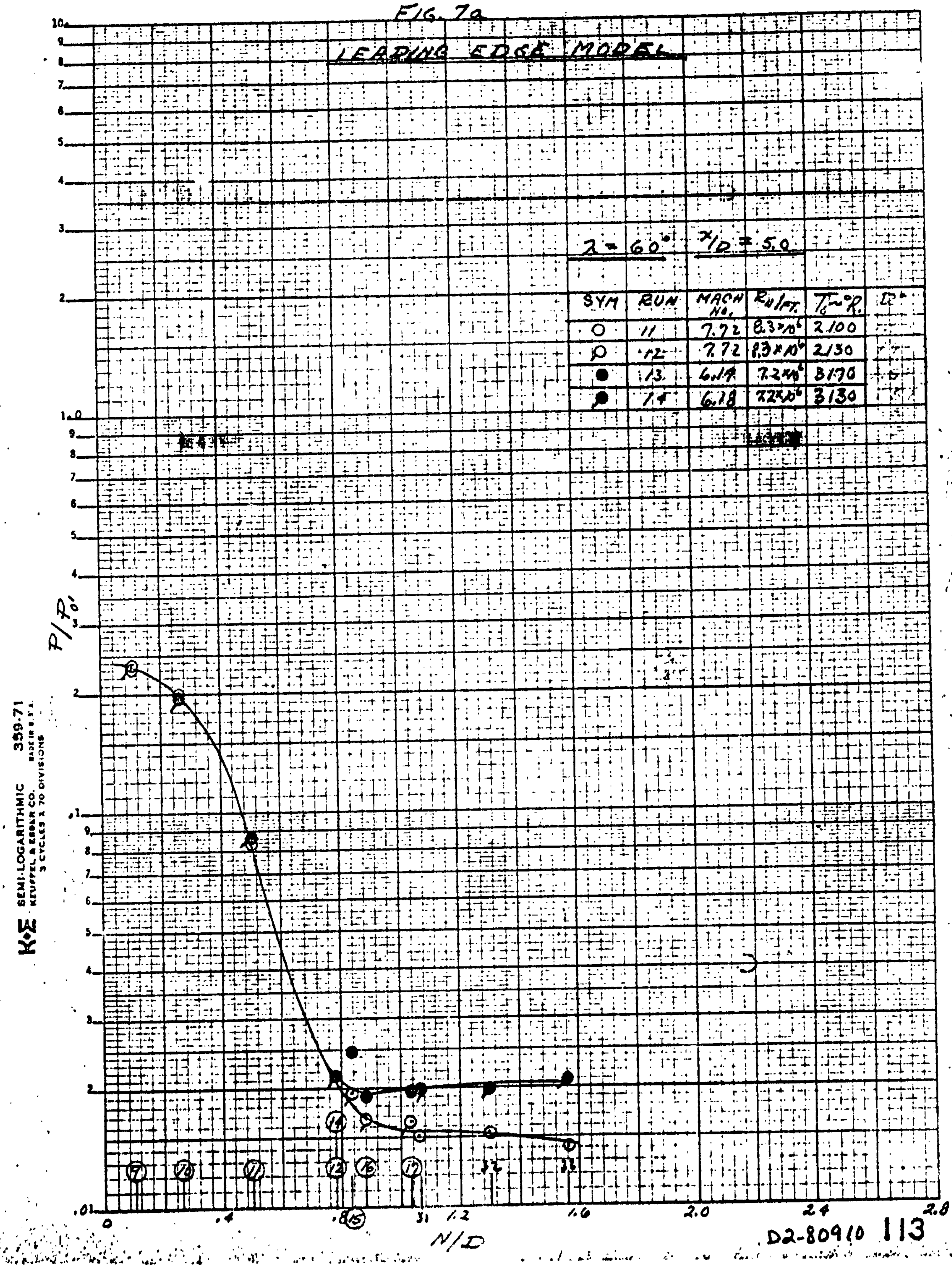


FIG. 7a
LEADING EDGE MODEL
λ = 60° x/D = 5.0
SYM RUN MACH NO. R_N/FT. T_0~°R.
○ 11 7.72 8.3×10⁶ 2100
○ 12 7.72 8.3×10⁶ 2130
● 13 6.14 7.2×10⁶ 3170
● 14 6.18 7.2×10⁶ 3130
P/P₀'
N/D
KE SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 76

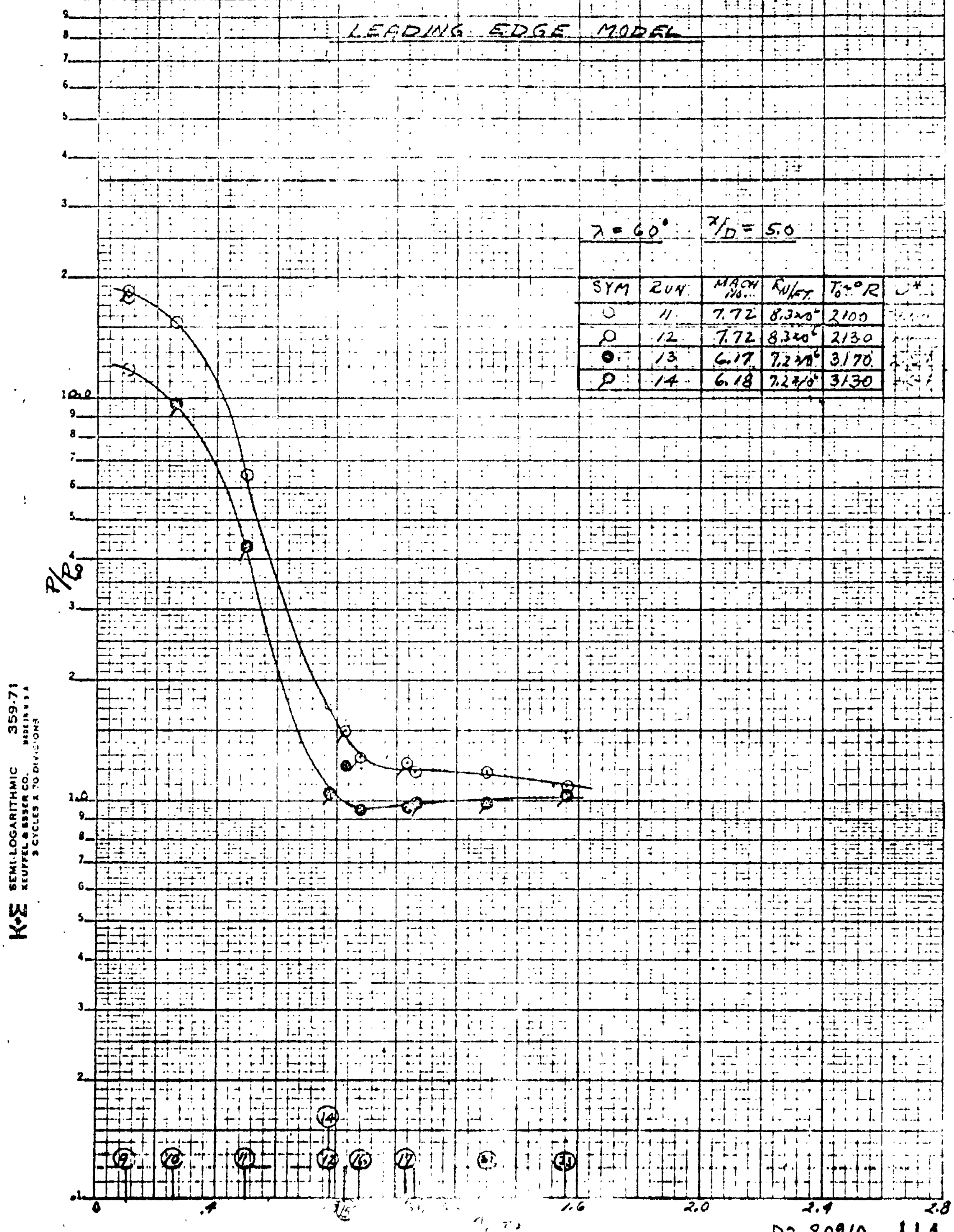

LEADING EDGE MODEL
λ = 60°   x/D = 5.0
SYM | RUN | MACH NO. | RN/FT | T₀ °R
11 | 7.72 | 8.3×10⁶ | 2100
12 | 7.72 | 8.3×10⁶ | 2130
13 | 6.17 | 7.2×10⁶ | 3170
14 | 6.18 | 7.2×10⁶ | 3130
P/P₀
K+E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS
0
.4
1.6
2.0
2.4
2.8

FIG. 7c

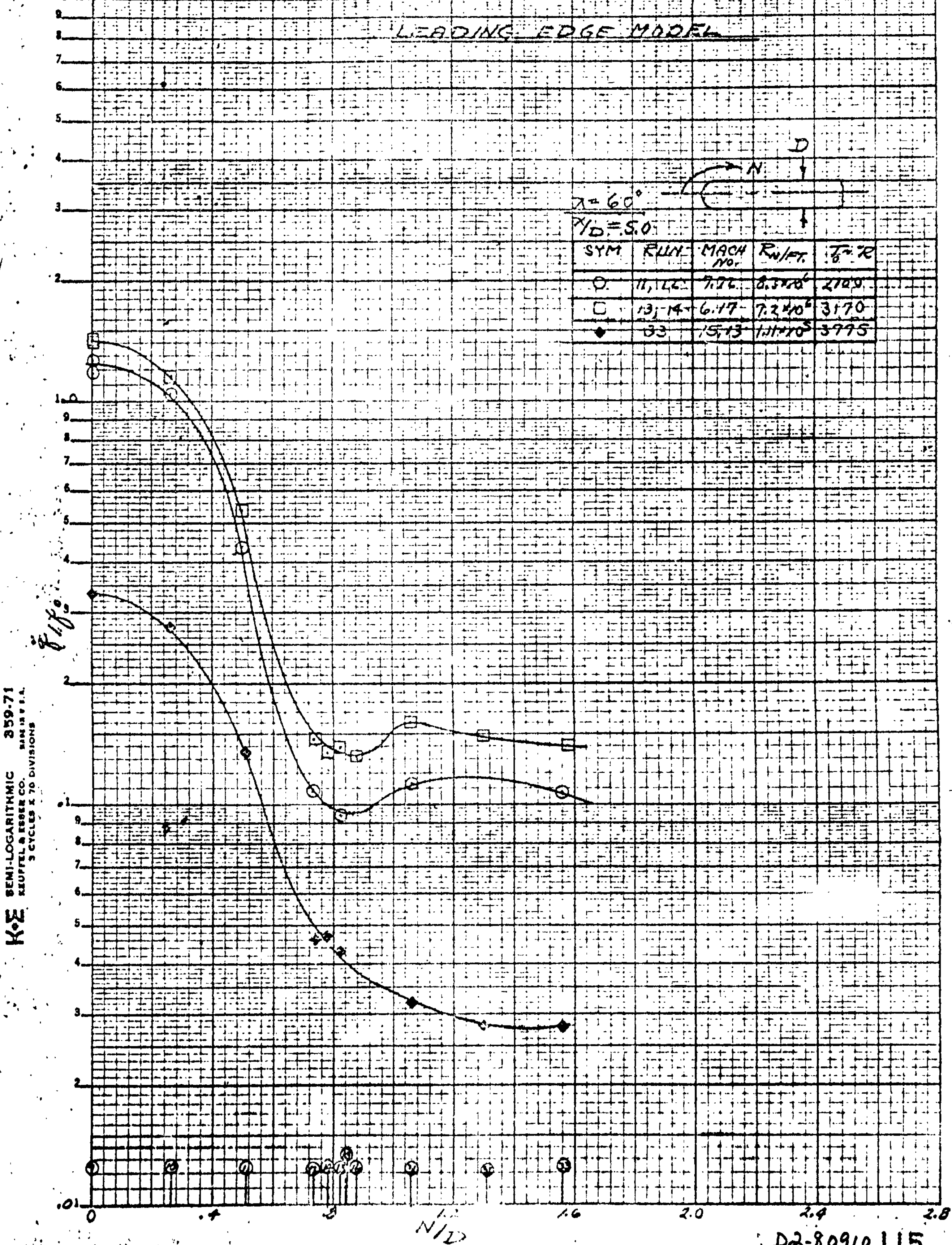

LEADING EDGE MODEL
λ = 60°
x/D = 5.0
D
N
SYM | RUN | MACH No. | R_N/FT. | T_0 °R
○ | 11, 12 | 7.76 | 8.5×10^6 | 2700
□ | 13, 14 | 6.17 | 7.2×10^6 | 3170
◆ | 33 | 15.13 | 1.11×10^5 | 3995
$\bar{h}/h_0$
N/D
K·E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

FIG. 7d

LEADING EDGE MODEL

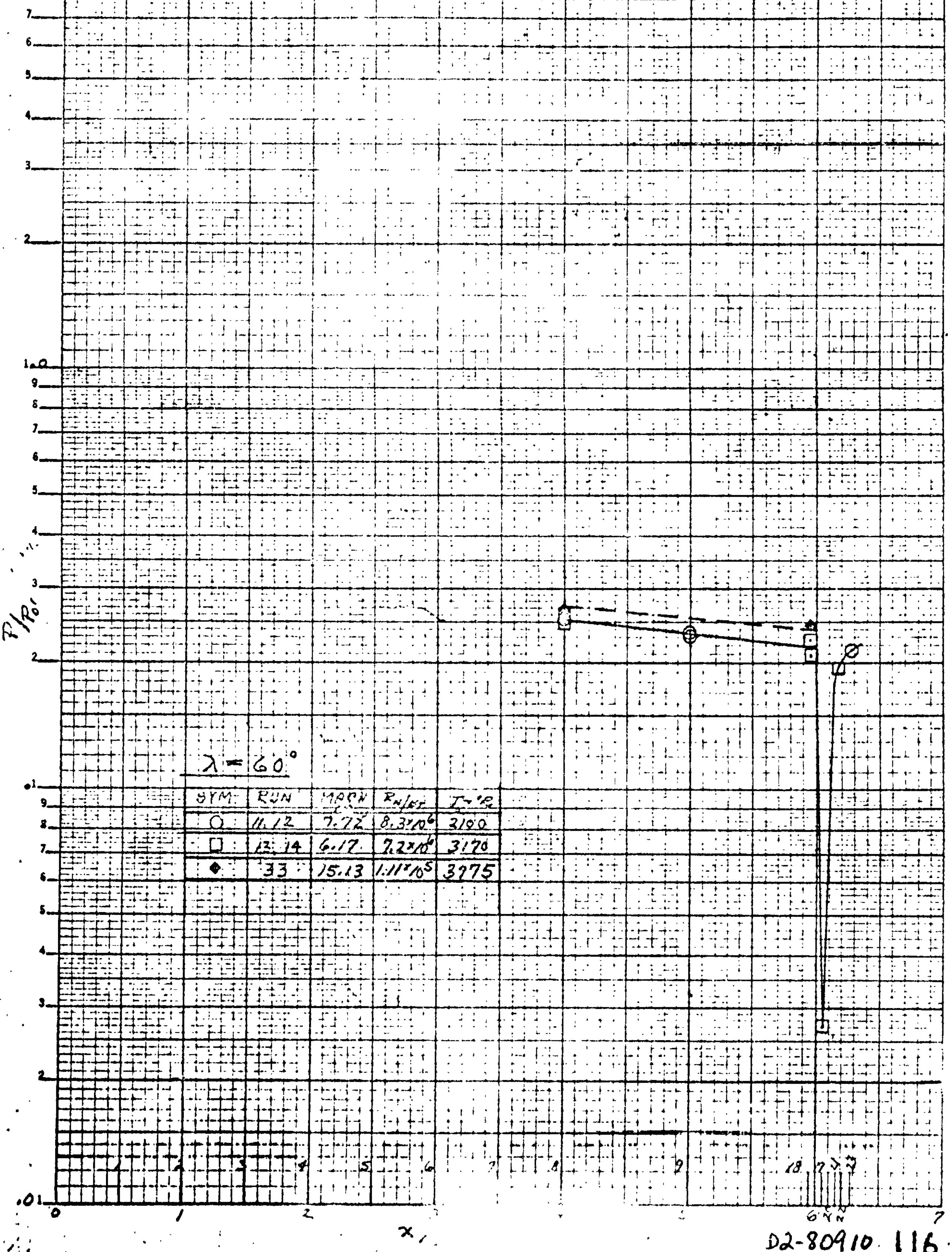


FIG. 7a

LEADING EDGE MODEL

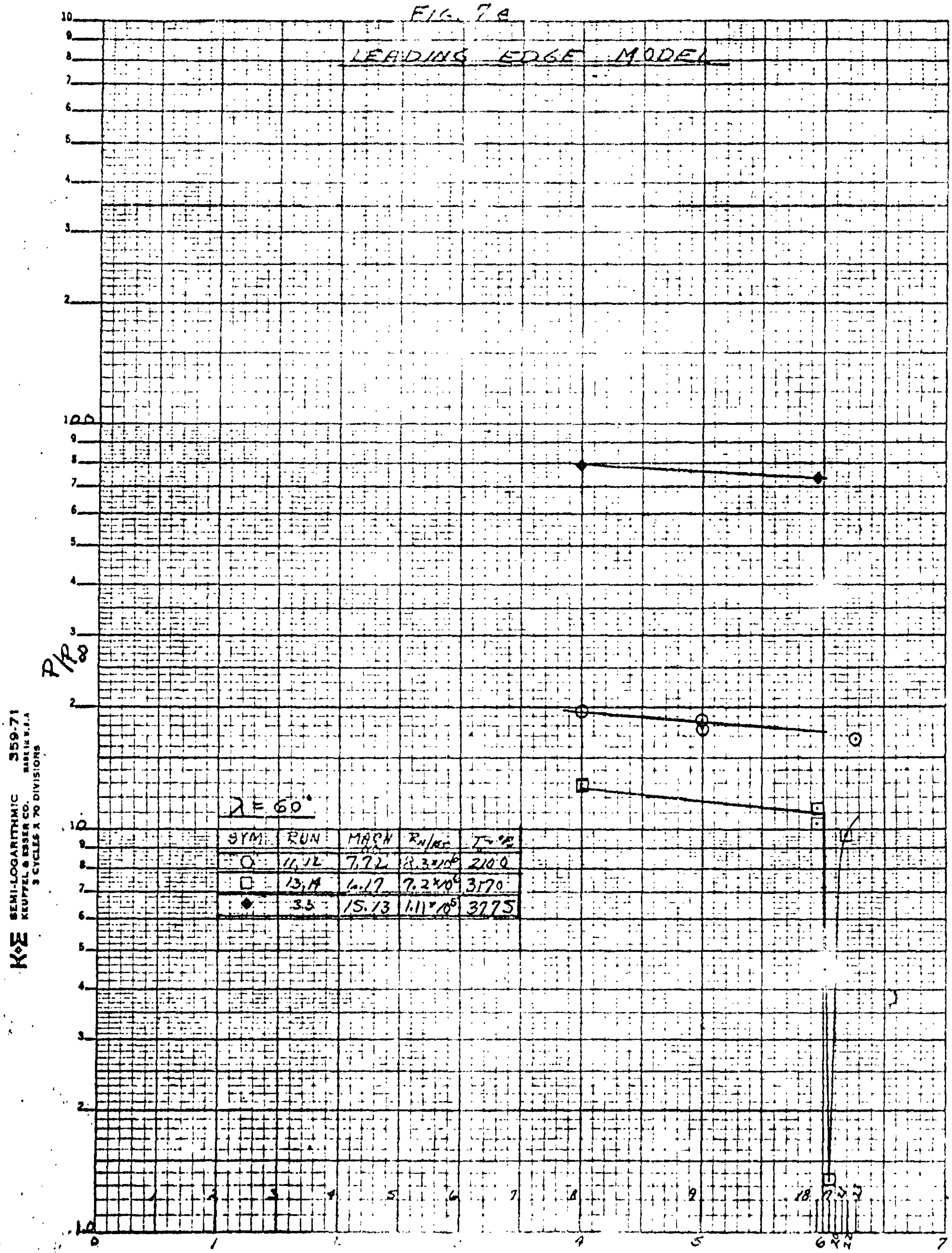
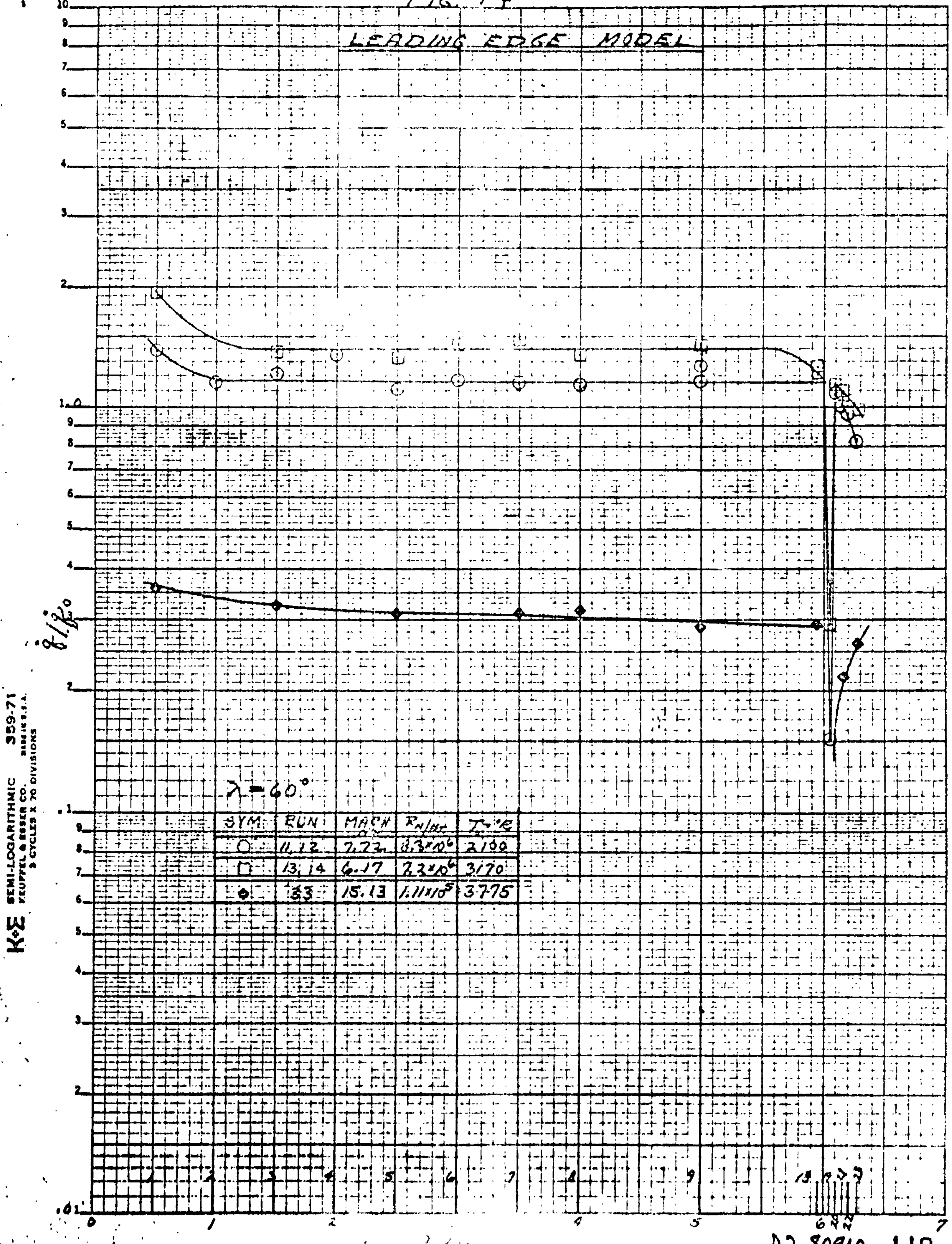
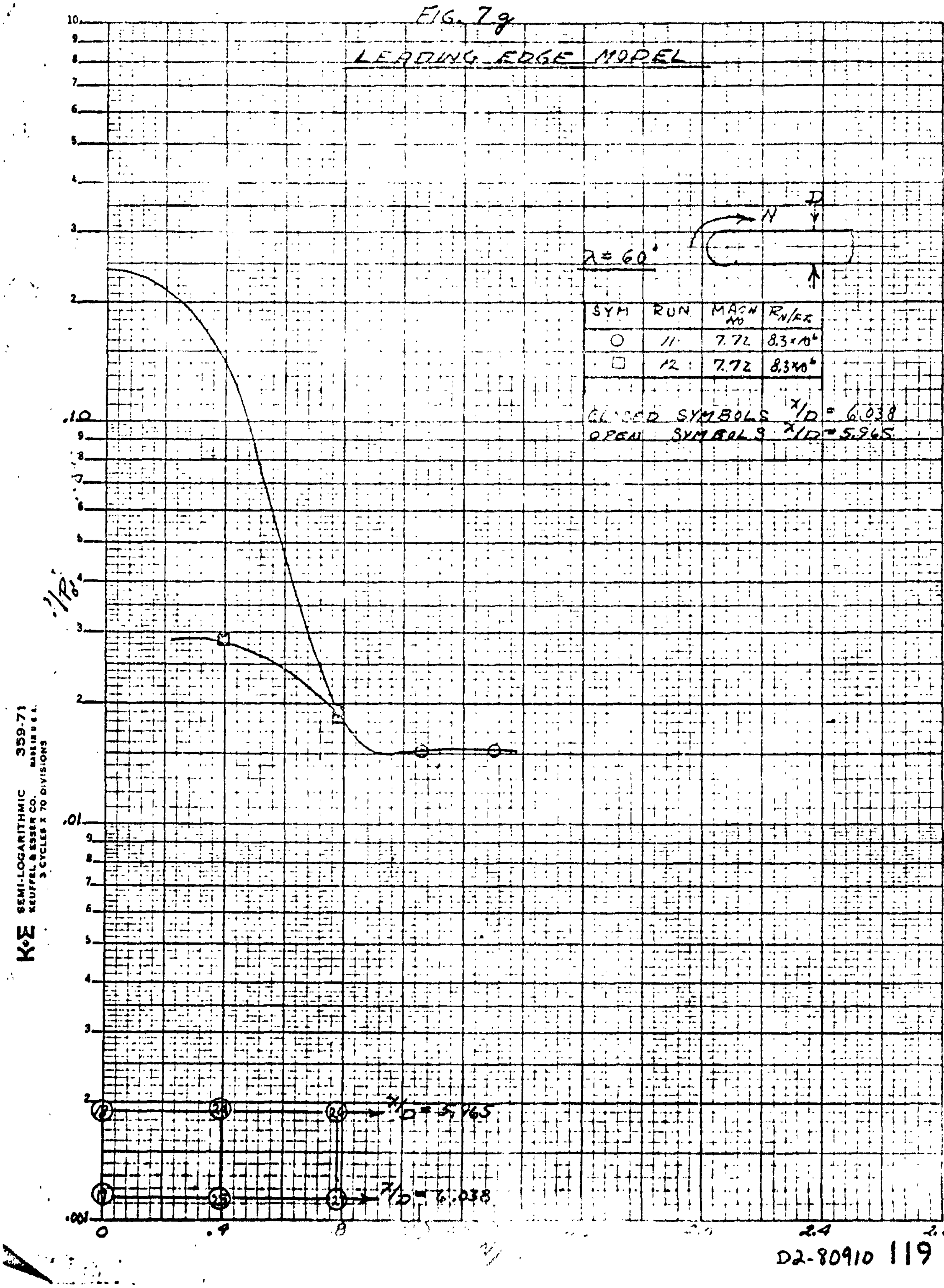


FIG. 7f



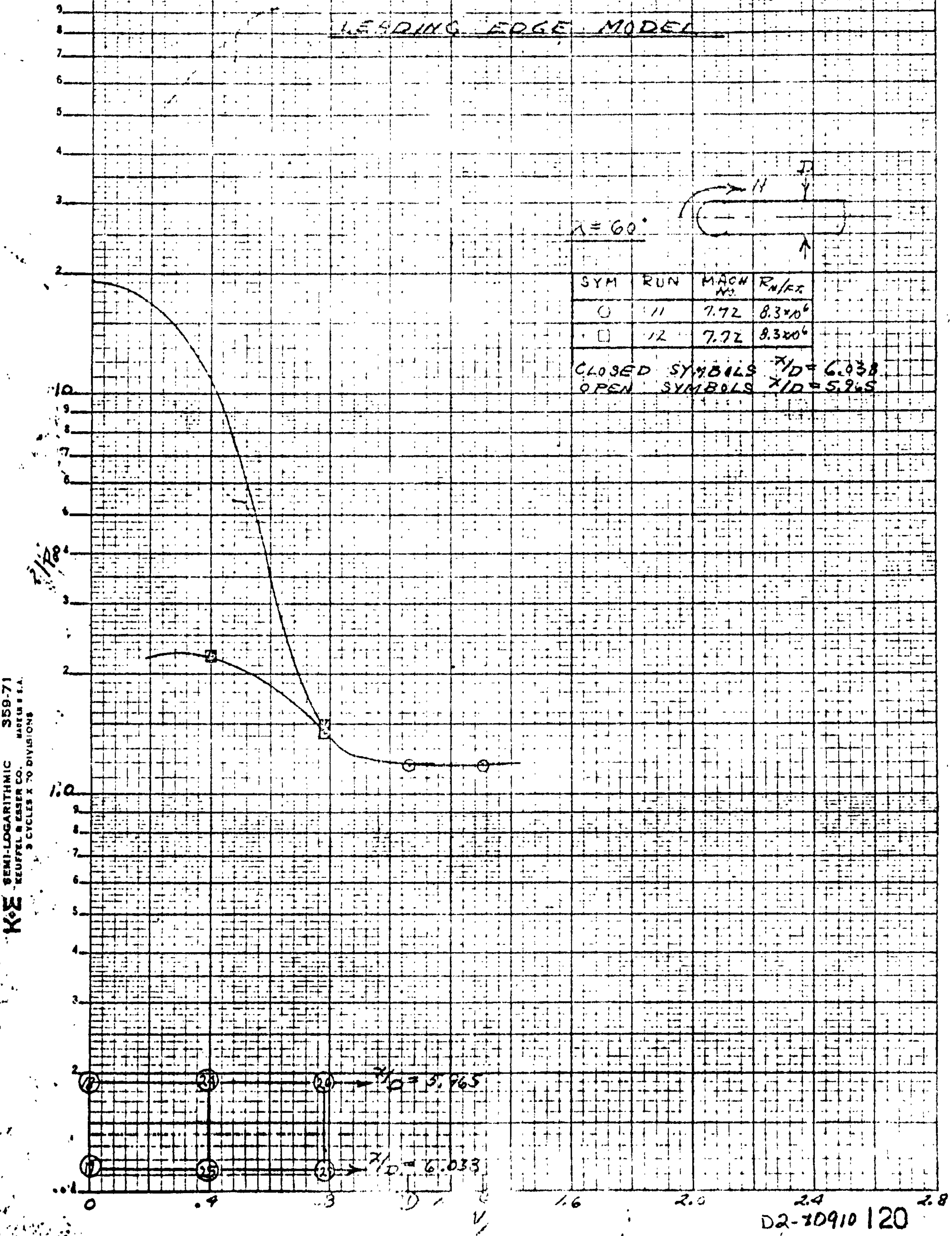
LEADING EDGE MODEL
$\lambda = 60°$
SYM RUN MACH R_N/ft T_0 °R
○ 11, 12 7.73 8.3×10⁶ 2100
□ 13, 14 6.17 7.2×10⁶ 3170
◆ 33 15.13 1.11×10⁵ 3775
$\dot{q}/\dot{q}_0$
s/D
K+E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 7g



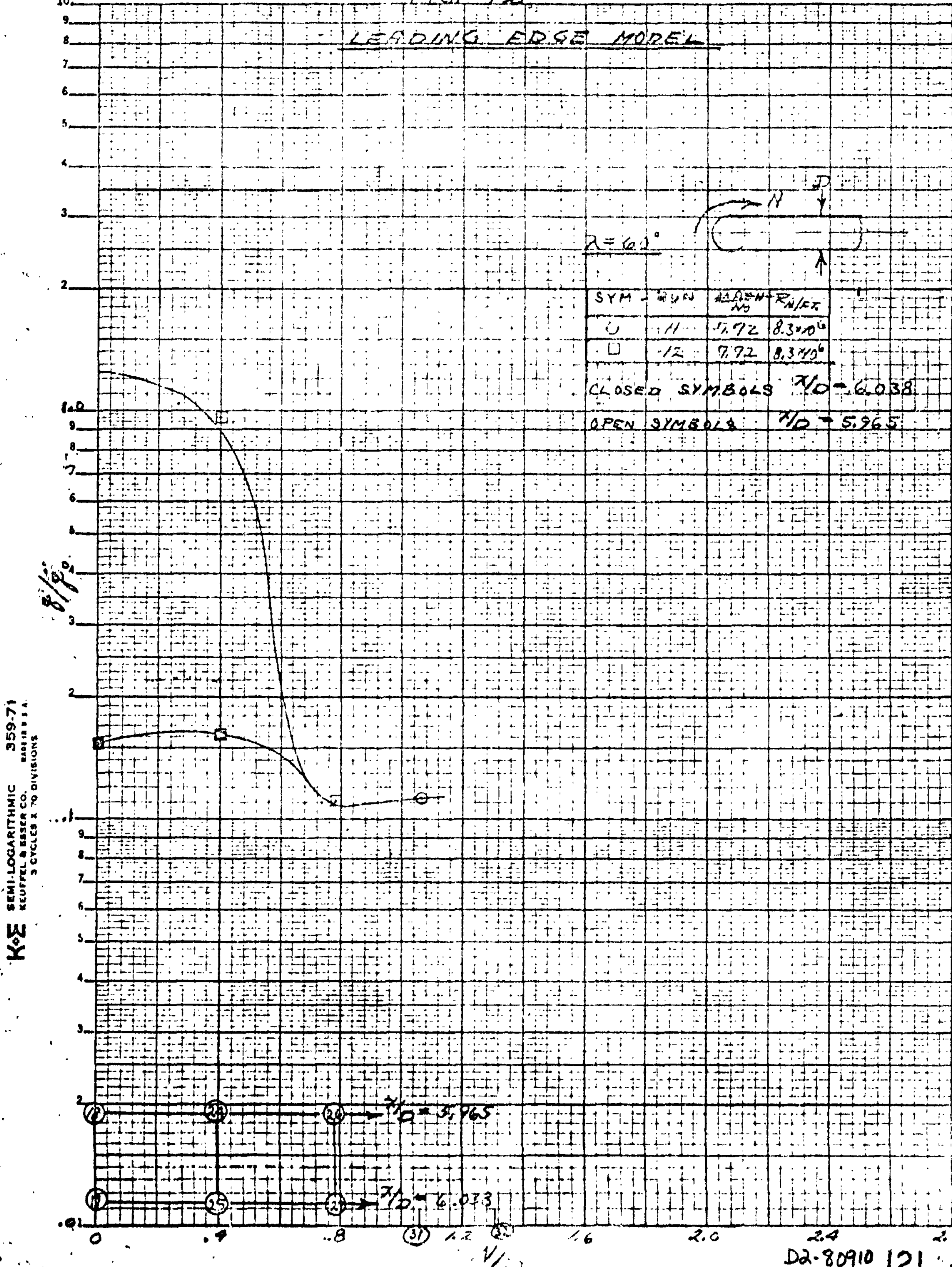
SYM	RUN	MACH NO	R_N/FT
○	11	7.72	8.3×10^6
□	12	7.72	8.3×10^6

FIG. 7 h



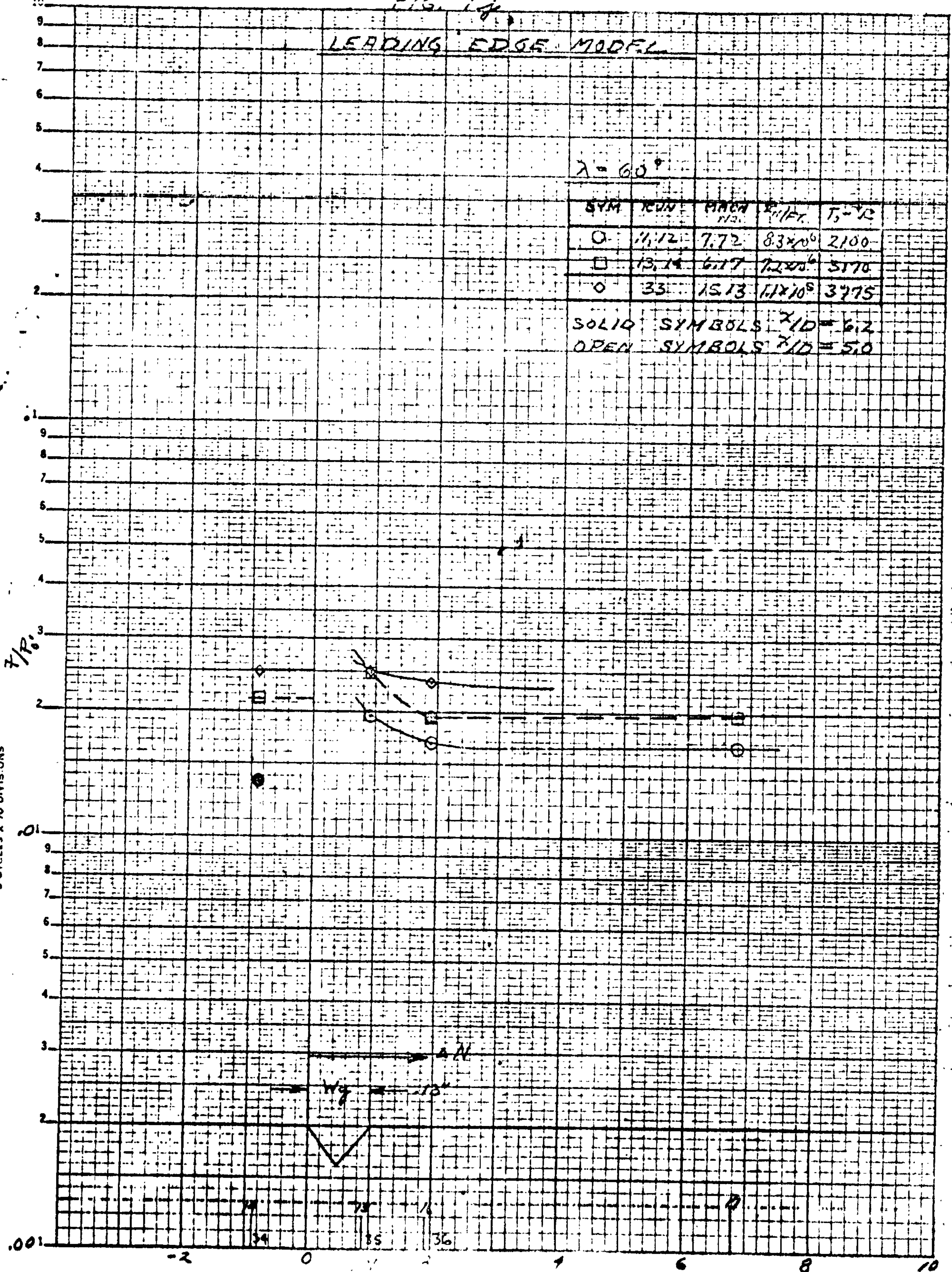
LEADING EDGE MODEL
Λ = 60°
N
D
SYM RUN MACH NO. R_N/FT.
○ 11 7.72 8.3×10⁶
□ 12 7.72 8.3×10⁶
CLOSED SYMBOLS X/D = 6.033
OPEN SYMBOLS X/D = 5.965
X/D = 5.965
X/D = 6.033
0
.4
.8
1.6
2.0
2.4
2.8
KE SEMI-LOGARITHMIC 359-71 KEUFFEL & ESSER CO. 3 CYCLES X 70 DIVISIONS MADE IN U.S.A.

FIG. 7i.



LEADING EDGE MODEL
λ = 61°
N
D
SYM | RUN | R_N/FT
○ 11 7.72 8.3×10^6
□ 12 7.72 8.3×10^6
CLOSED SYMBOLS X/D = 6.038
OPEN SYMBOLS X/D = 5.965
X/D = 5.965
X/D = 6.033
0 .4 .8 1.2 1.6 2.0 2.4 2.8
K+E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

FIG. 7j



K&E SEMI-LOGARITHMIC 359-71 KEUFFEL & ESSER CO. MADE IN U.S.A. 3 CYCLES X 70 DIVISIONS

FIG. 7b

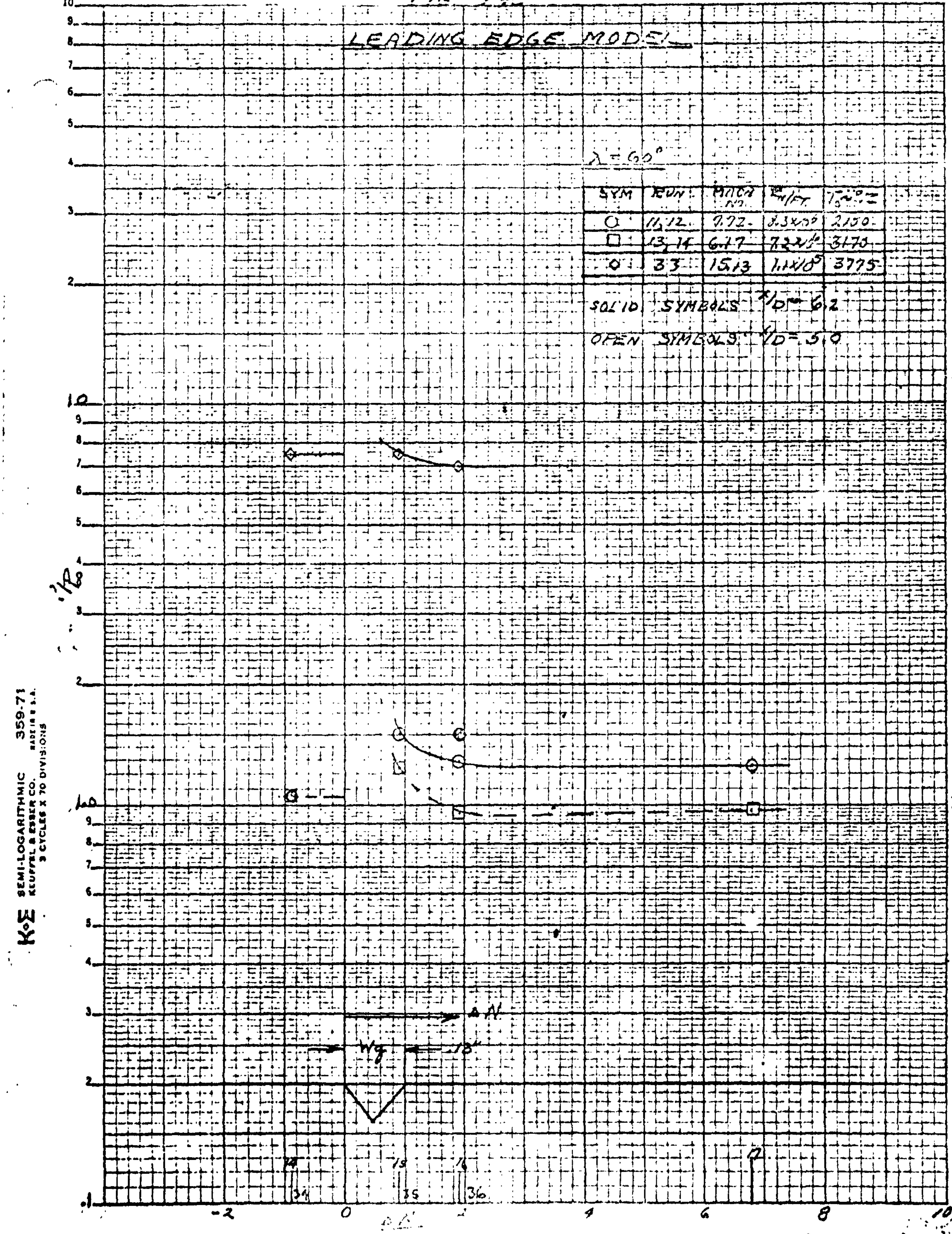
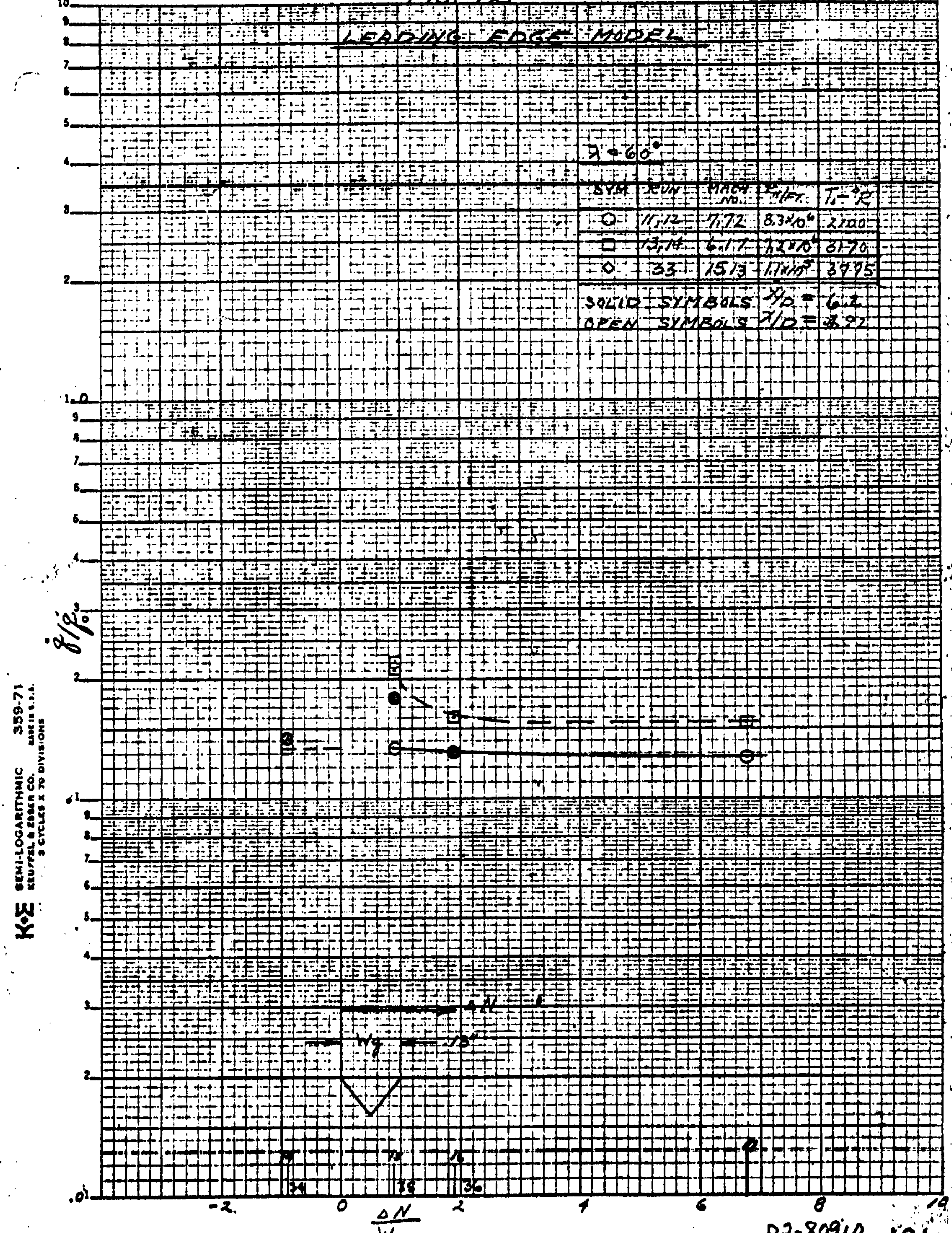

LEADING EDGE MODEL
λ = 60°
SYM | RUN | MACH NO. | Re/FT. | T₀ °R
○ | 11, 12 | 7.72 | 2.3x10⁵ | 2100
□ | 13, 14 | 6.77 | 7.2x10⁵ | 3170
◇ | 33 | 15.13 | 1.1x10⁵ | 3775
SOLID SYMBOLS X/D = 6.2
OPEN SYMBOLS X/D = 5.0
ΔN
Wg
13"
14
15
16
17
34
35
36
-2
0
2
4
6
8
10
1.0
10
.1
K&E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 7b



LEADING EDGE MODEL
λ = 60°
SYM | RUN | MACH NO. | R/FT. | T_t - °R
○ | 11,12 | 7.72 | 8.3×10⁶ | 2100
□ | 13,14 | 6.17 | 1.2×10⁶ | 6170
◇ | 33 | 15.13 | 1.1×10⁵ | 3775
SOLID SYMBOLS X/D = 6.2
OPEN SYMBOLS X/D = 3.92
$\dot{q}/\dot{q}_0$
ΔN
W_g = .15"
-2 0 2 4 6 8 10
$\frac{\Delta N}{W_g}$
K•E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 7m

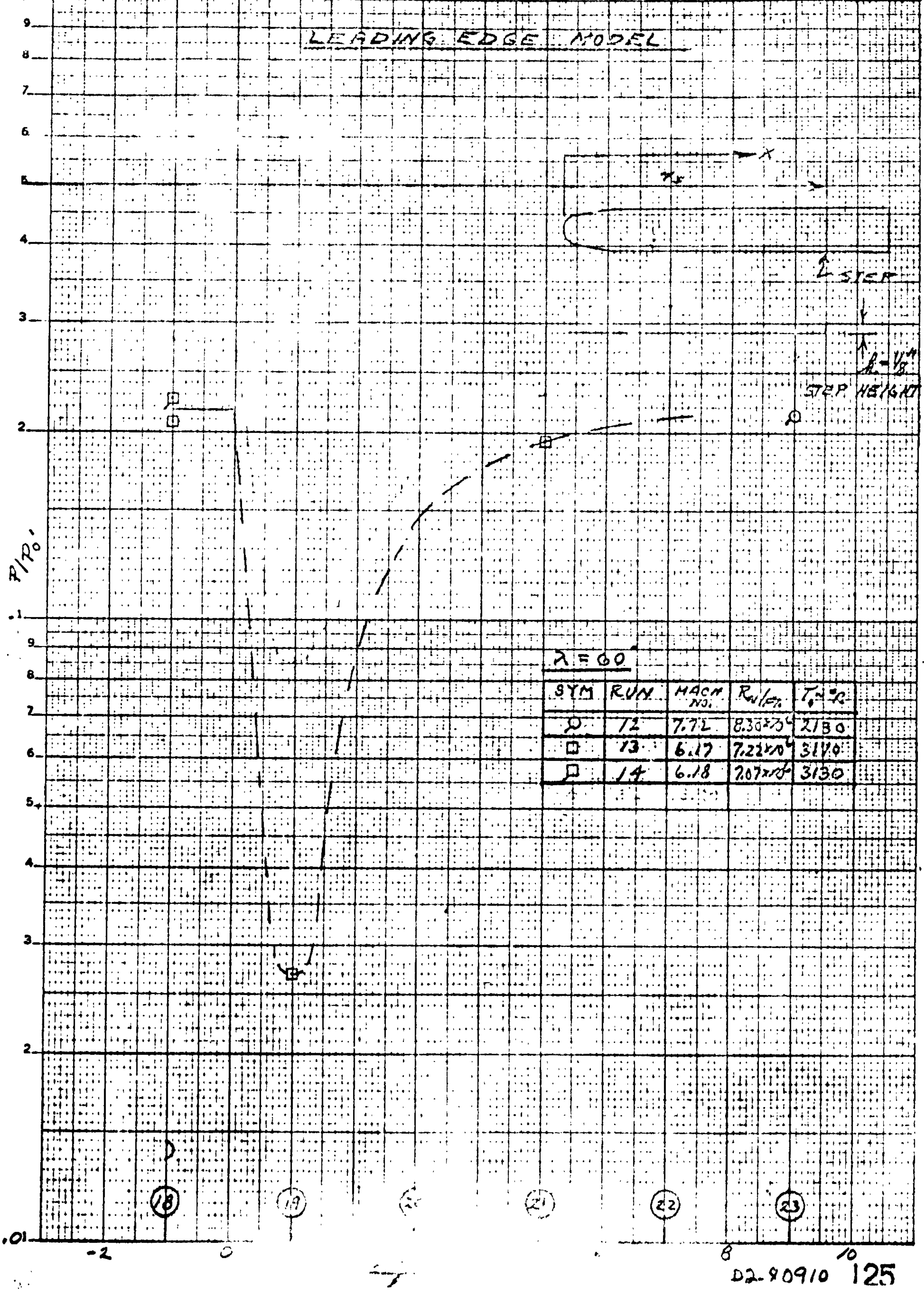
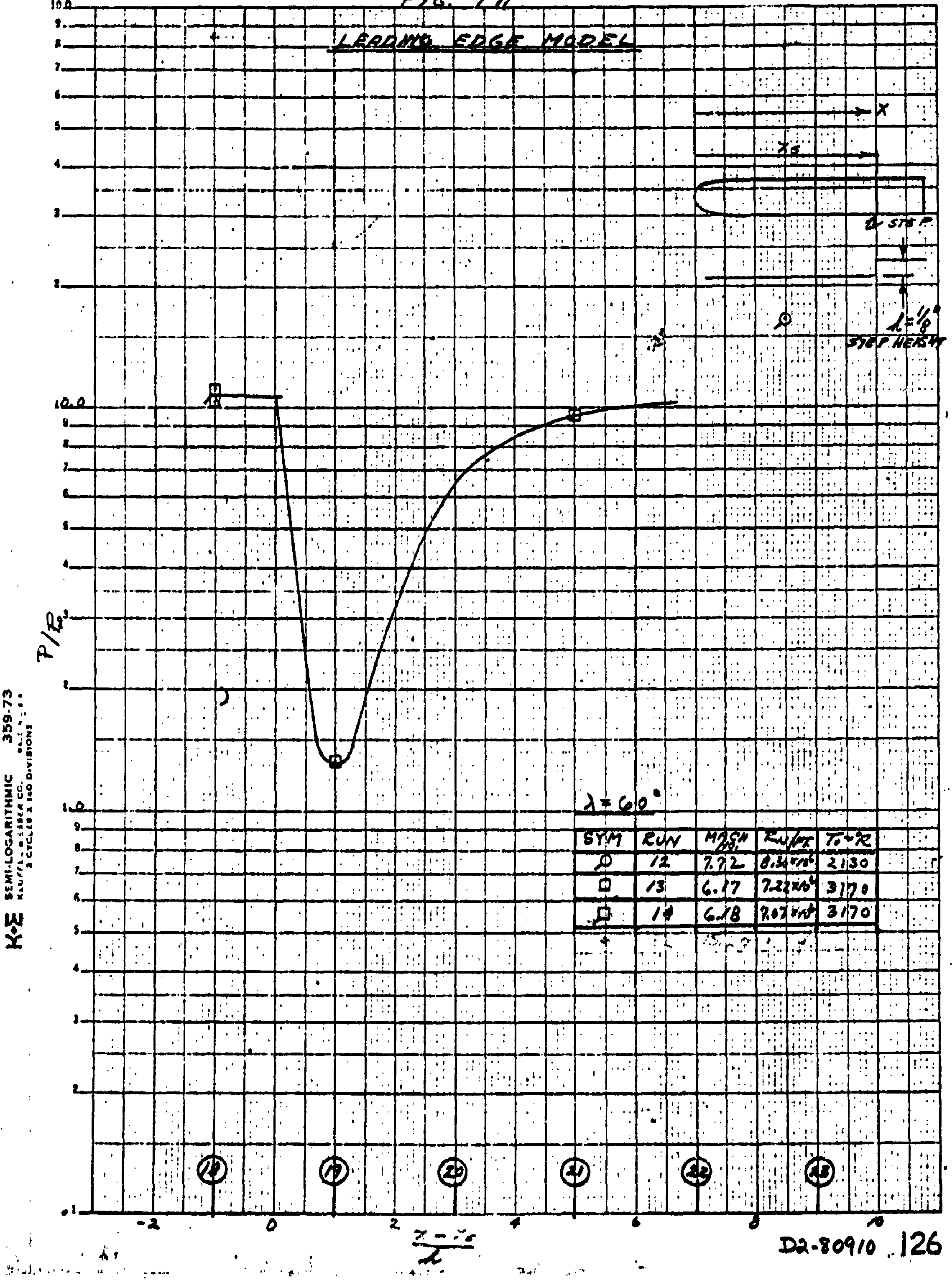
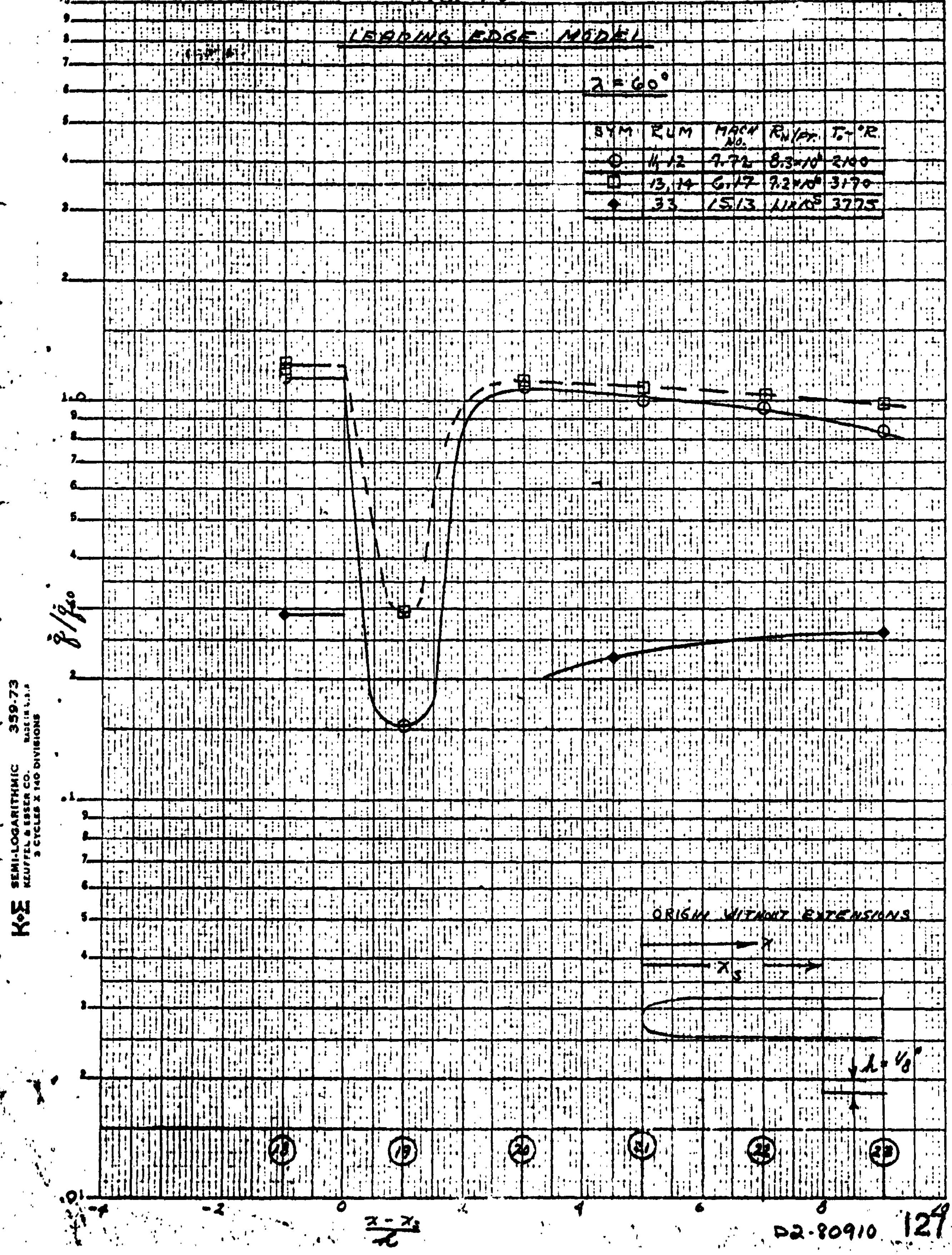

LEADING EDGE MODEL
x
x_s
STEP
h = 1/8"
STEP HEIGHT
p/p₀'
λ = 60°
SYM | RUN | MACH NO. | R_N/FT | T_0 °R
○ | 72 | 7.72 | 8.30×10⁶ | 2180
⊡ | 73 | 6.17 | 7.22×10⁶ | 3170
□ | 74 | 6.18 | 7.07×10⁶ | 3130
18
19
21
22
23
-2
0
8
10
.01
.1
1.0

FIG. 7n



LEADING EDGE MODEL
X
x_s
STEP
$h = 1/8"$
STEP HEIGHT
P/P_∞
$\lambda = 60°$
SYM | RUN | MACH NO. | R_N/FT | T_0 °R
○ | 12 | 7.72 | 8.34×10^6 | 2130
□ | 13 | 6.17 | 7.22×10^6 | 3170
□ | 14 | 6.18 | 7.07×10^6 | 3170
18
19
20
21
22
23
-2
0
2
4
6
8
10
$\frac{x - x_s}{h}$
K+E SEMI-LOGARITHMIC 359-73
KEUFFEL & ESSER CO.
3 CYCLES X 140 DIVISIONS

FIG. 7c


LEADING EDGE MODEL
λ = 60°
SYM RUN MACH NO. R_N/FT. T_0 ~ °R
11, 12 7.72 8.3×10⁶ 2100
13, 14 6.17 7.2×10⁶ 3170
33 15.13 1.1×10⁵ 3775
$\bar{q}/\bar{q}_{s0}$
$\frac{x - x_s}{h}$
ORIGIN WITHOUT EXTENSIONS
x
x_s
h = 1/8"
18
19
20
21
22
23
KE SEMI-LOGARITHMIC 359-73
KEUFFEL & ESSER CO.
3 CYCLES X 140 DIVISIONS

PRESSURE AND HEAT TRANSFER

DISTRIBUTIONS

OVER A BLUNT LEADING EDGE

$\lambda = 65°$

FIGURE 8

FIG. 8a

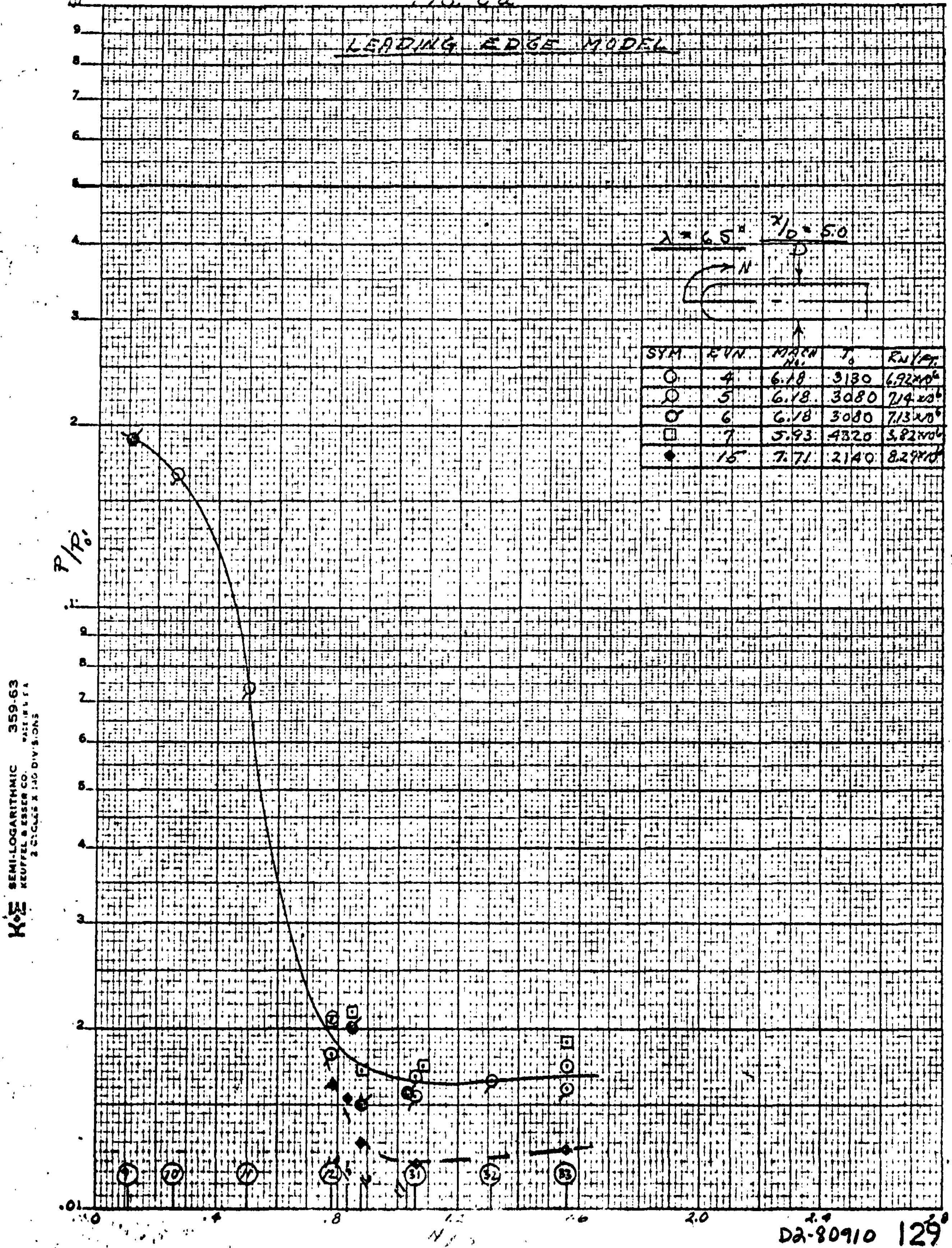

LEADING EDGE MODEL
λ = 6.5"
x/D = 5.0
N
SYM. RUN MACH No. T0 RN/FT.
4 6.18 3130 6.92×10^6
5 6.18 3080 7.14×10^6
6 6.18 3080 7.13×10^6
7 5.93 4320 3.82×10^6
15 7.71 2140 8.29×10^6
P/P0
N
SEMI-LOGARITHMIC 359-63
KEUFFEL & ESSER CO.
2 CYCLES X 130 DIVISIONS

FIG. 8b

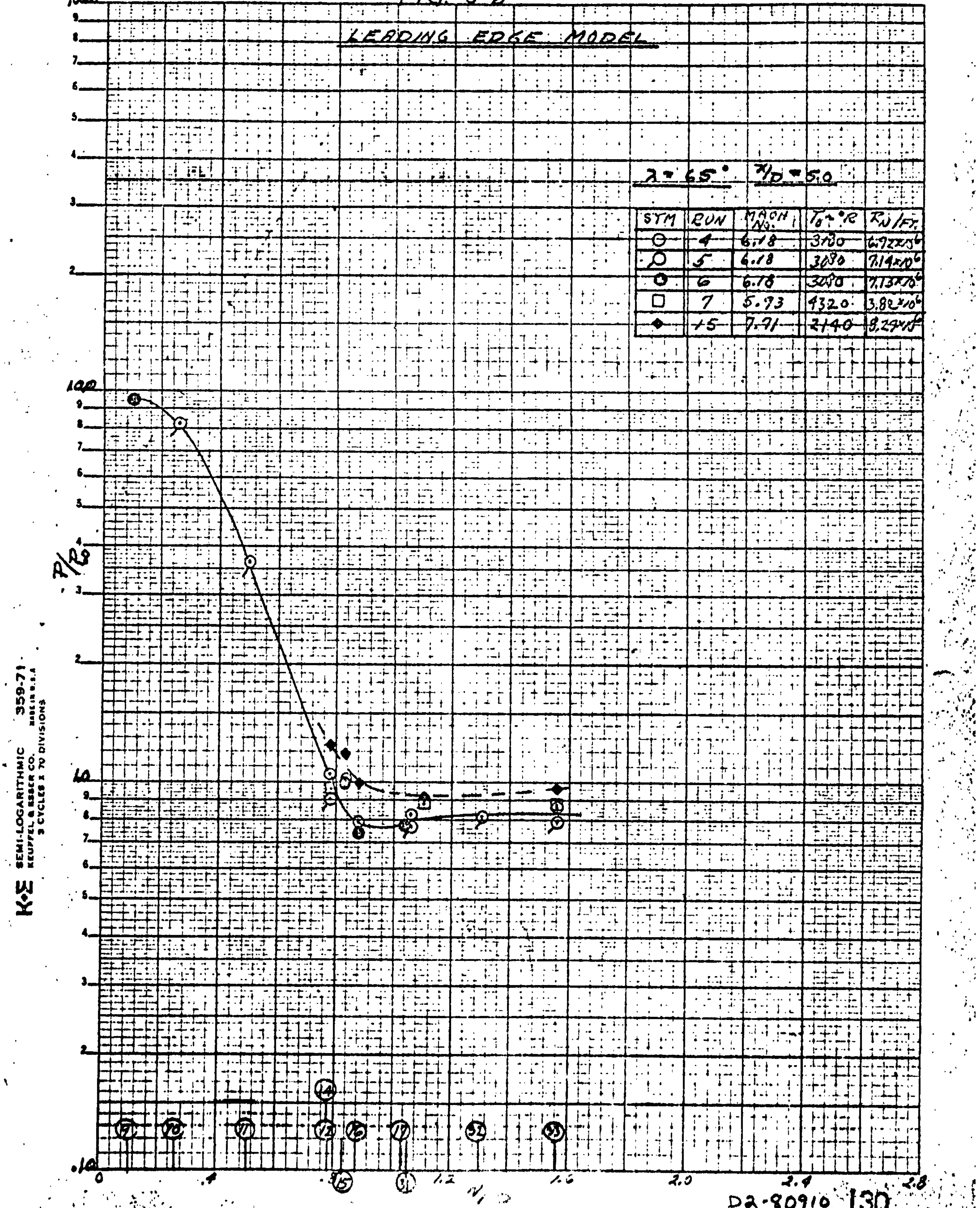

LEADING EDGE MODEL
λ = 65° x/D = 5.0
STM
RUN
MACH No.
T_0 °R
R_N/FT.
4 6.18 3100 6.92×10^6
5 6.18 3080 7.14×10^6
6 6.18 3080 7.13×10^6
7 5.93 4320 3.82×10^6
15 7.71 2140 8.29×10^6
P/P0
K&E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 8c

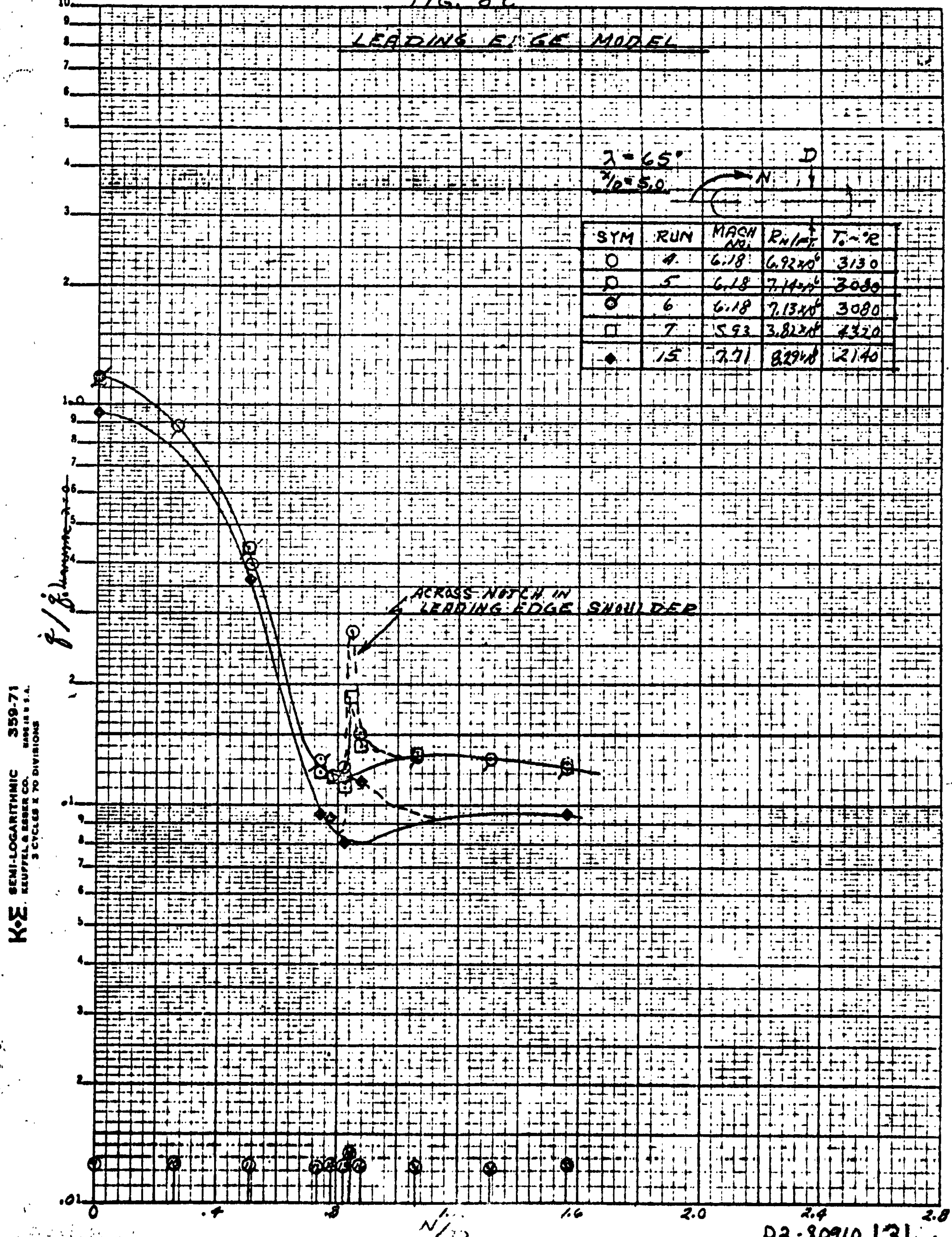

LEADING EDGE MODEL
λ = 65°
N
D
SYM RUN MACH NO. R_N/FT. T_o ~ °R
4 6.18 6.92×10⁶ 3130
5 6.18 7.14×10⁶ 3080
6 6.18 7.13×10⁶ 3080
7 5.93 3.82×10⁶ 4320
15 7.71 8.29×10⁶ 2140
ACROSS NOTCH IN LEADING EDGE SHOULDER
K·E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS
0 .4 .8 1.2 1.6 2.0 2.4 2.8
N/D

FIG. 8d

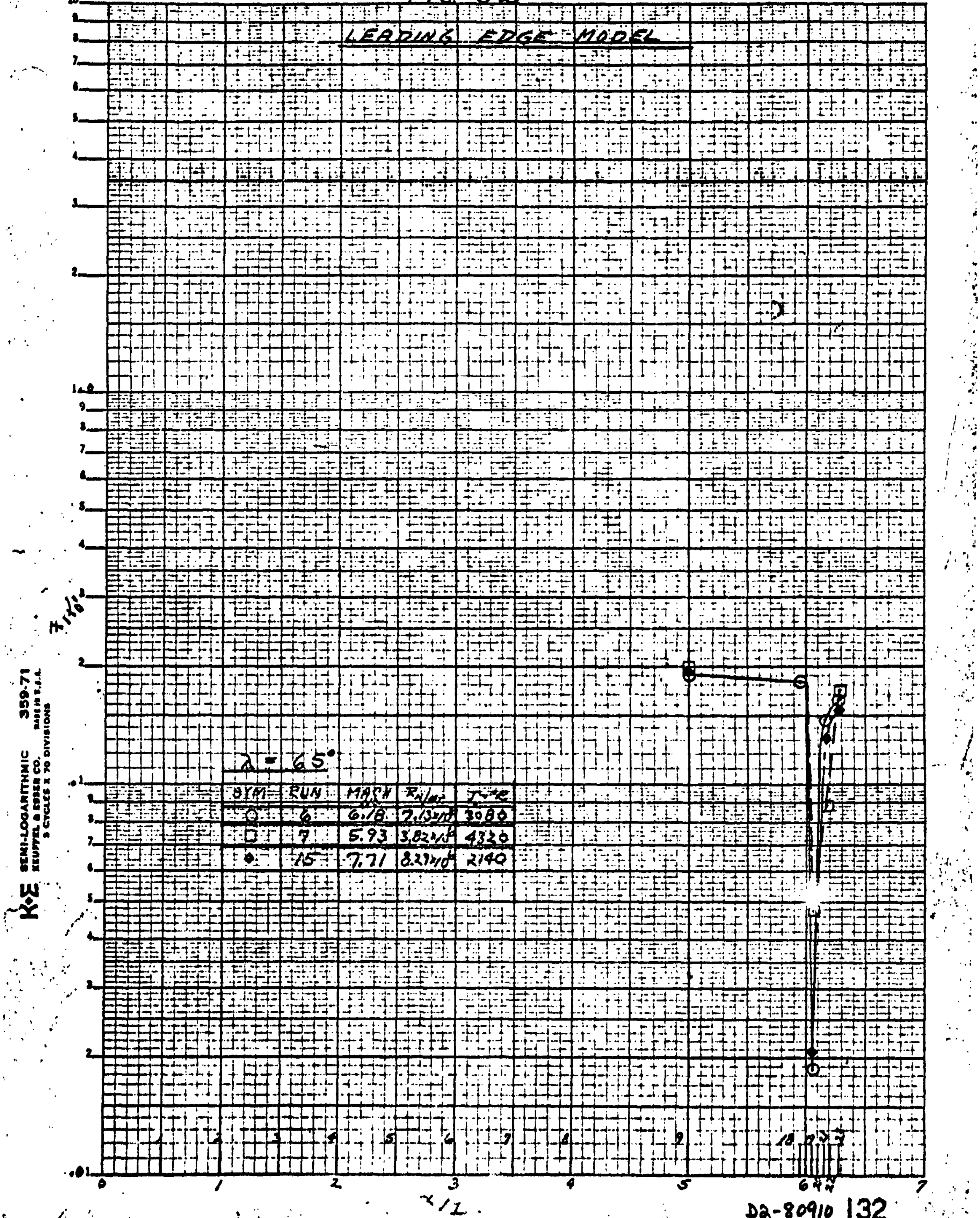

LEADING EDGE MODEL
λ = 65°
SYM RUN MACH R/FT T
○ 6 6.18 7.13x10^6 3080
□ 7 5.93 3.82x10^6 4320
◆ 15 7.71 8.29x10^6 2140
x/L
K·E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

FIG. 8e

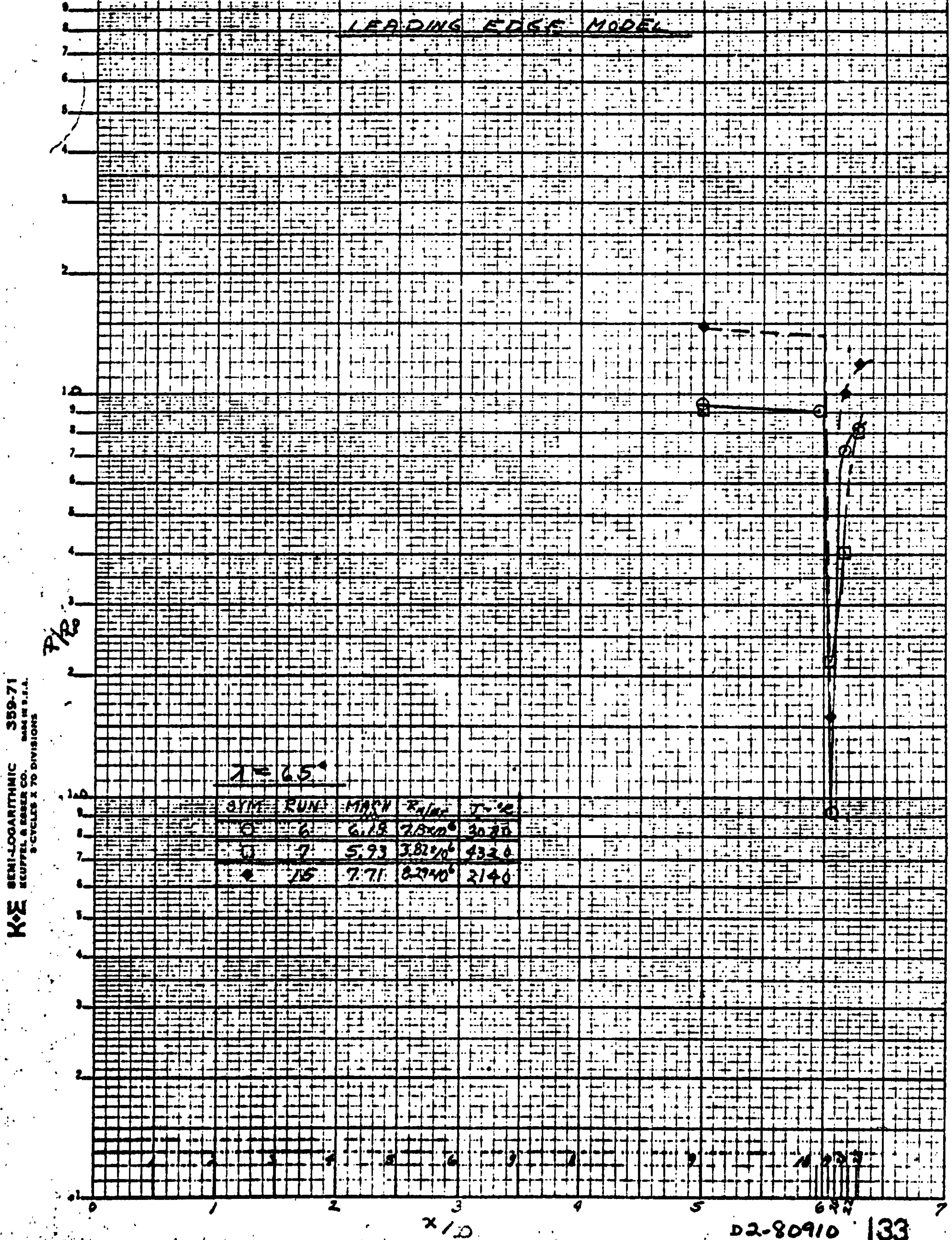
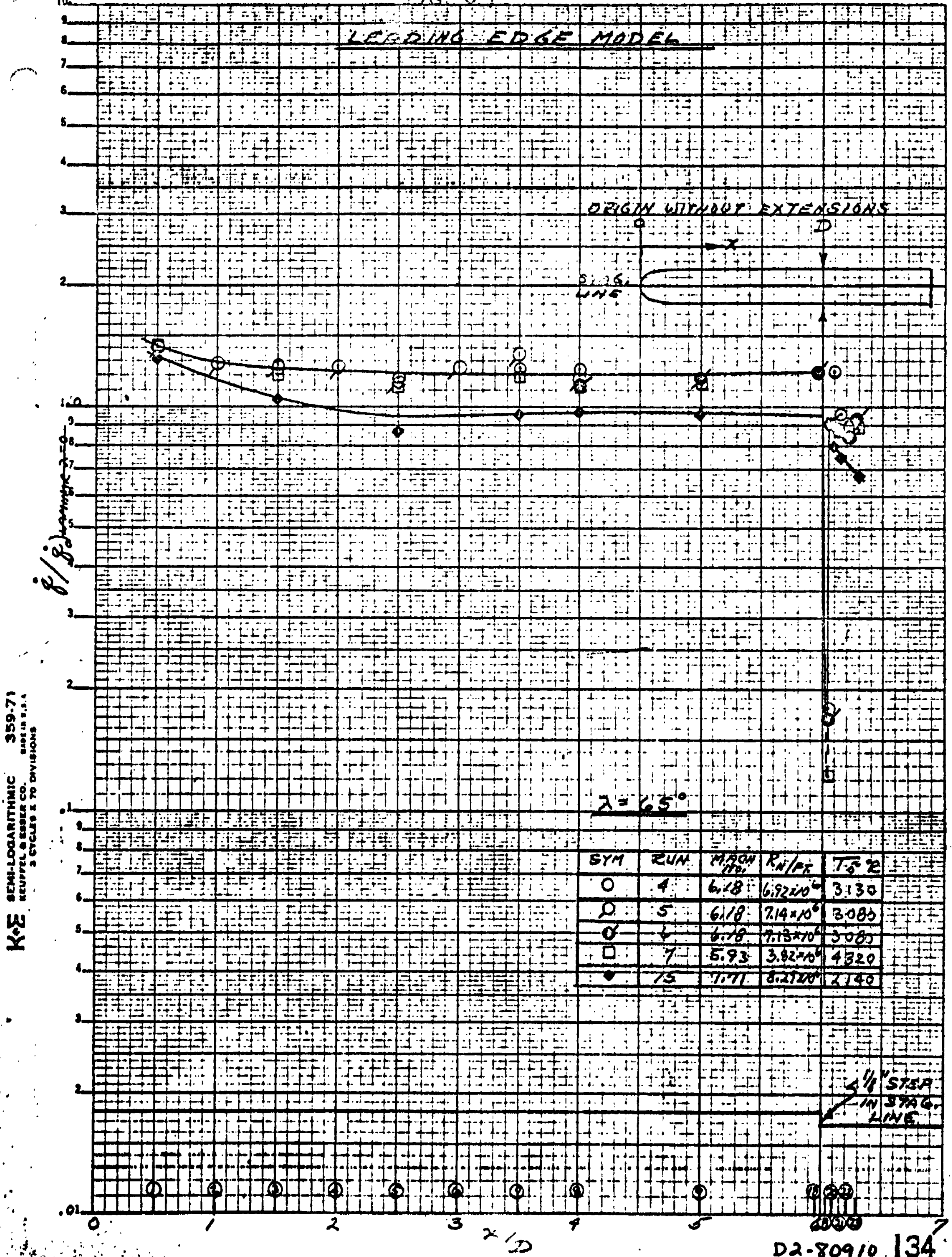

LEADING EDGE MODEL
Λ = 65°
SYM RUN MACH R_N/in T_0 °R
○ 6 6.18 7.8×10^6 3080
□ 7 5.93 3.82×10^6 4320
◆ 15 7.71 8.27×10^6 2140
P/P0
x/D
KE SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 8 f



LEADING EDGE MODEL
ORIGIN WITHOUT EXTENSIONS
STAG. LINE
$\lambda = 65°$
SYM RUN MACH N_∞ R_N/FT T_o °R
4 6.18 6.92x10^6 3130
5 6.18 7.14x10^6 3085
6 6.18 7.13x10^6 3085
7 5.93 3.82x10^6 4320
15 7.71 8.27x10^6 2140
1/8" STEP IN STAG. LINE
x/D

FIG. 8g

LEADING EDGE MODEL

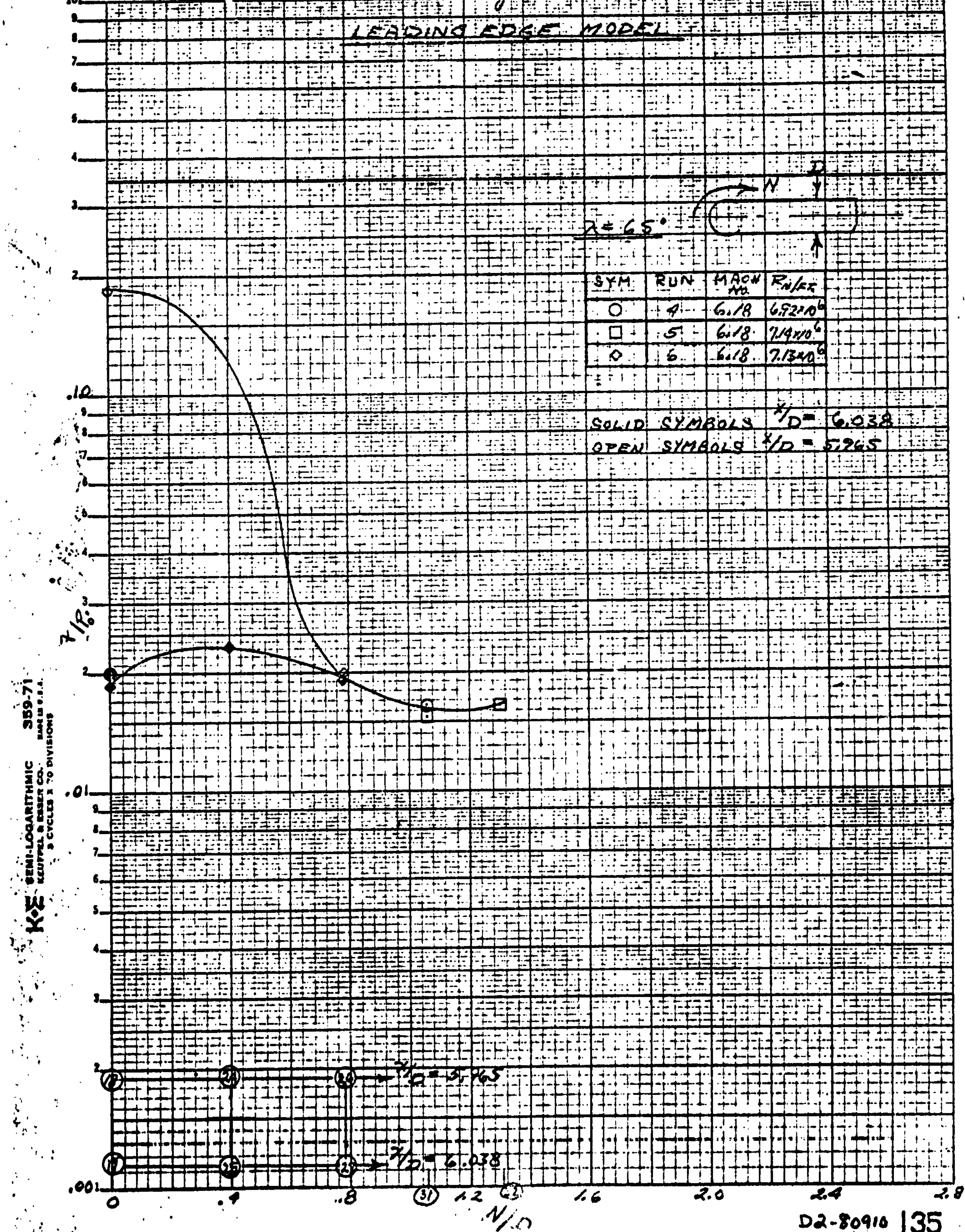
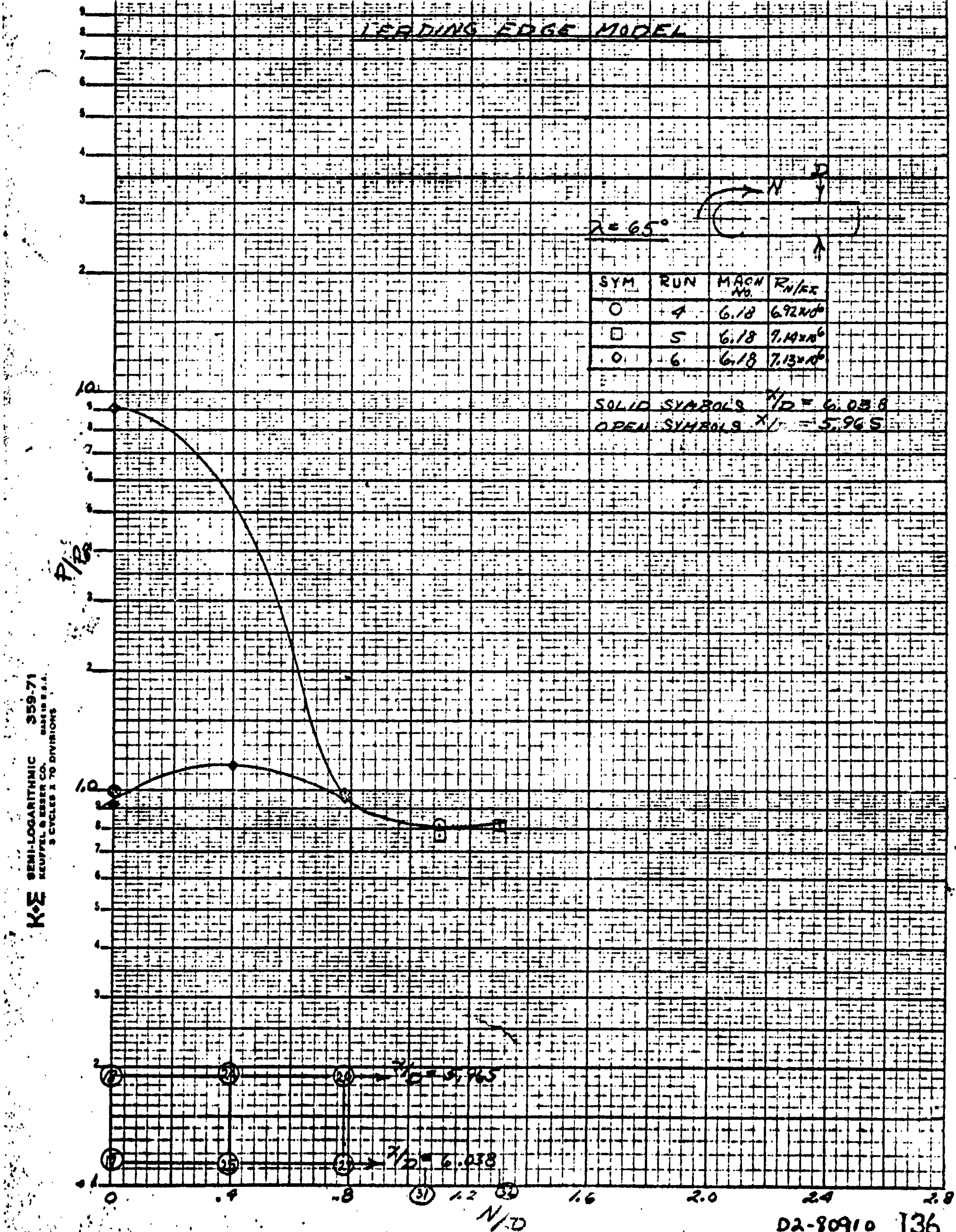


FIG. 8h



SYM	RUN	MACH NO.	RN/FT
○	4	6.18	6.92×10^6
□	5	6.18	7.14×10^6
○	6	6.18	7.13×10^6

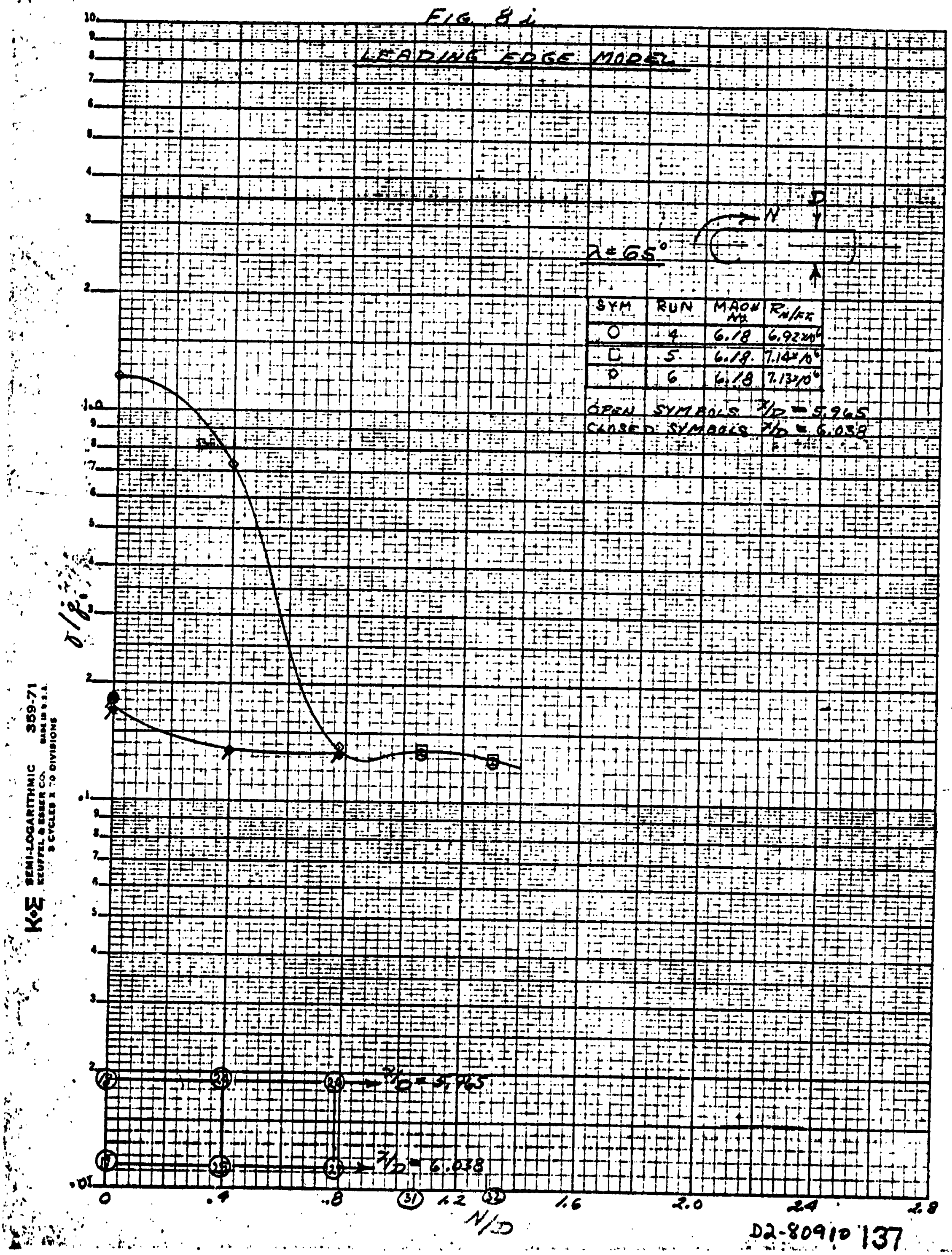
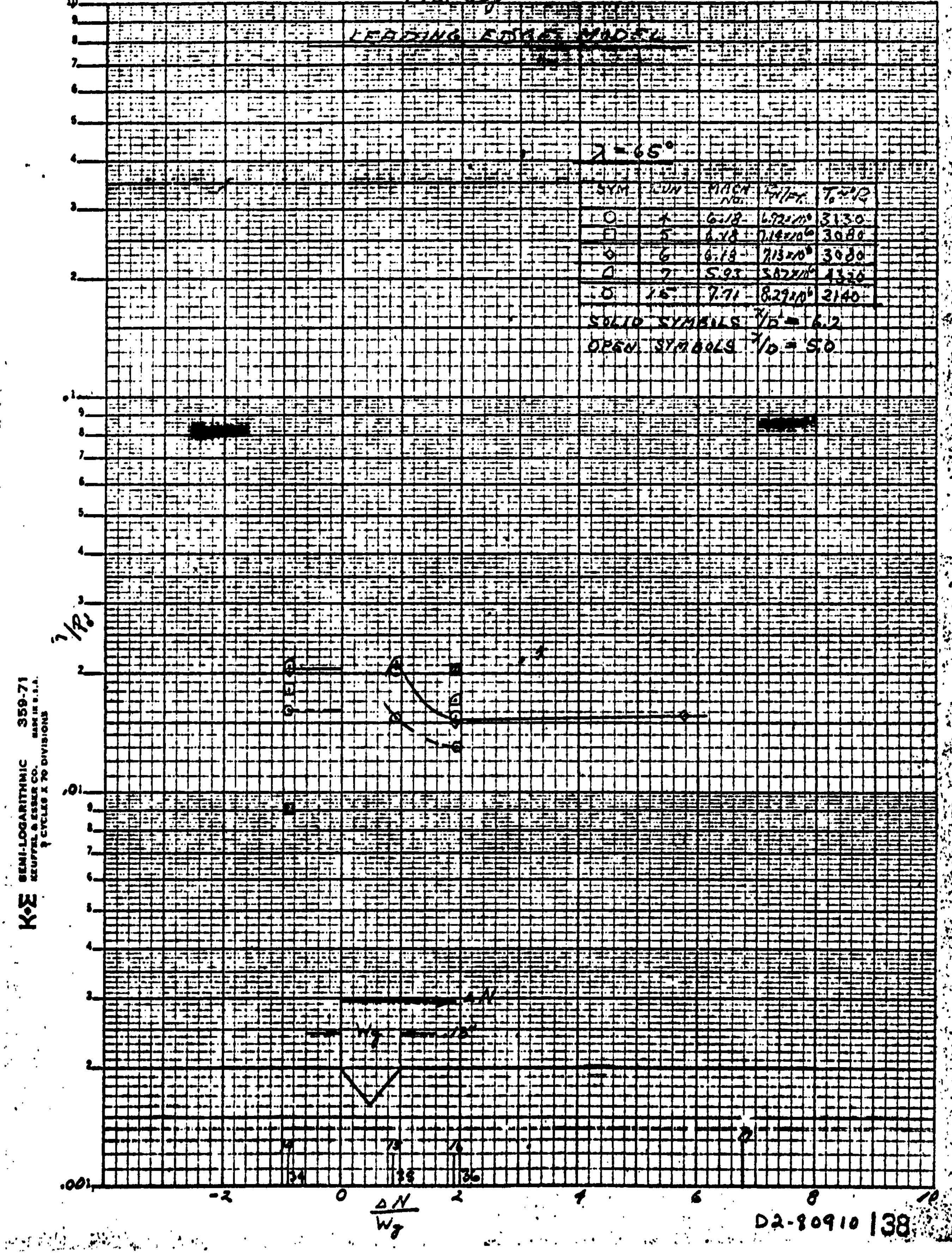


FIG. 8i
LEADING EDGE MODEL
λ=65°
N
D
SYM RUN MACH NO. R_N/FT
4 6.18 6.92x10^6
5 6.18 7.14x10^6
6 6.18 7.13x10^6
OPEN SYMBOLS Z/D = 5.965
CLOSED SYMBOLS Z/D = 6.038
Z/D = 5.965
Z/D = 6.038
N/D

FIG. 8j


LEADING EDGE MODEL
λ = 65°
SYM | RUN | MACH NO. | Re/FT. | T₀ ~ °R
○ | 4 | 6.18 | 6.92×10⁶ | 3130
□ | 5 | 6.18 | 7.14×10⁶ | 3080
◇ | 6 | 6.13 | 7.13×10⁶ | 3080
△ | 7 | 5.93 | 5.07×10⁶ | 4330
○ | 15 | 7.71 | 8.29×10⁶ | 2140
SOLID SYMBOLS R/D = 6.2
OPEN SYMBOLS R/D = 5.0
h/h₀
ΔN
Wg
.13"
ΔN/Wg
-2
0
2
4
6
8
10
.1
.01
.001
K+E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

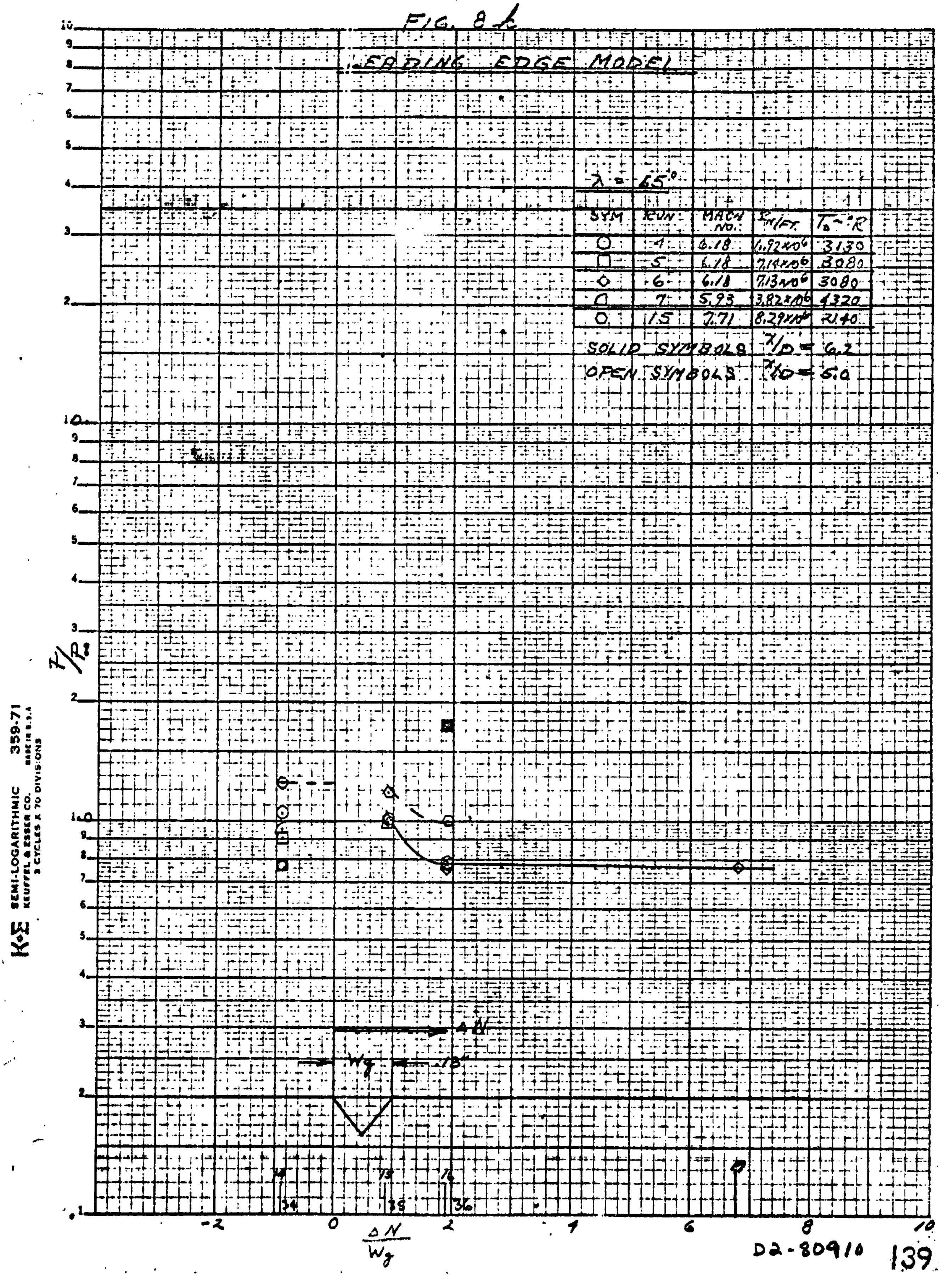
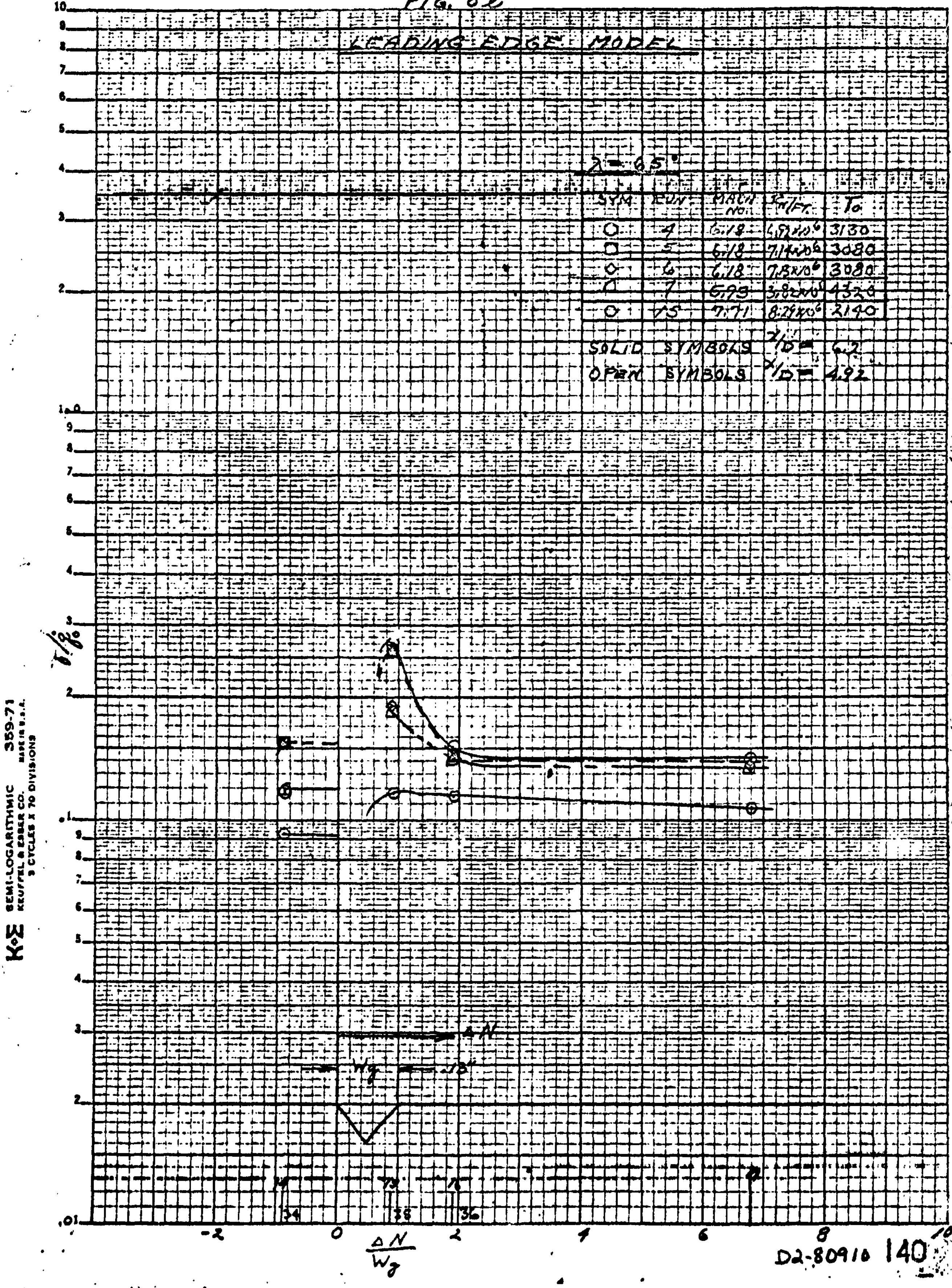


FIG. 8k
LEADING EDGE MODEL
λ = 65°
SYM RUN MACH NO. Re/FT. T₀ ~ °R
○ 1 6.18 1.92×10⁶ 3130
□ 5 6.18 7.14×10⁶ 3080
◇ 6 6.18 7.13×10⁶ 3080
⌂ 7 5.93 3.82×10⁶ 4320
○ 15 7.71 8.29×10⁶ 2140
SOLID SYMBOLS X/D = 6.2
OPEN SYMBOLS X/D = 5.0
P/P∞
ΔN
Wg
.18"
ΔN/Wg
-2
0
2
4
6
8
10

FIG. 8l



LEADING EDGE MODEL
λ = 65°
SYM RUN MACH NO. Re/FT. To
4 6.18 6.92x10^6 3130
5 6.18 7.14x10^6 3080
6 6.18 7.8x10^6 3080
7 6.93 3.82x10^6 4320
15 7.71 8.79x10^6 2140
SOLID SYMBOLS X/D = 6.2
OPEN SYMBOLS X/D = 4.92
h/h0
ΔN
Wg
.13"
-2
0
2
4
6
8
10
ΔN/Wg

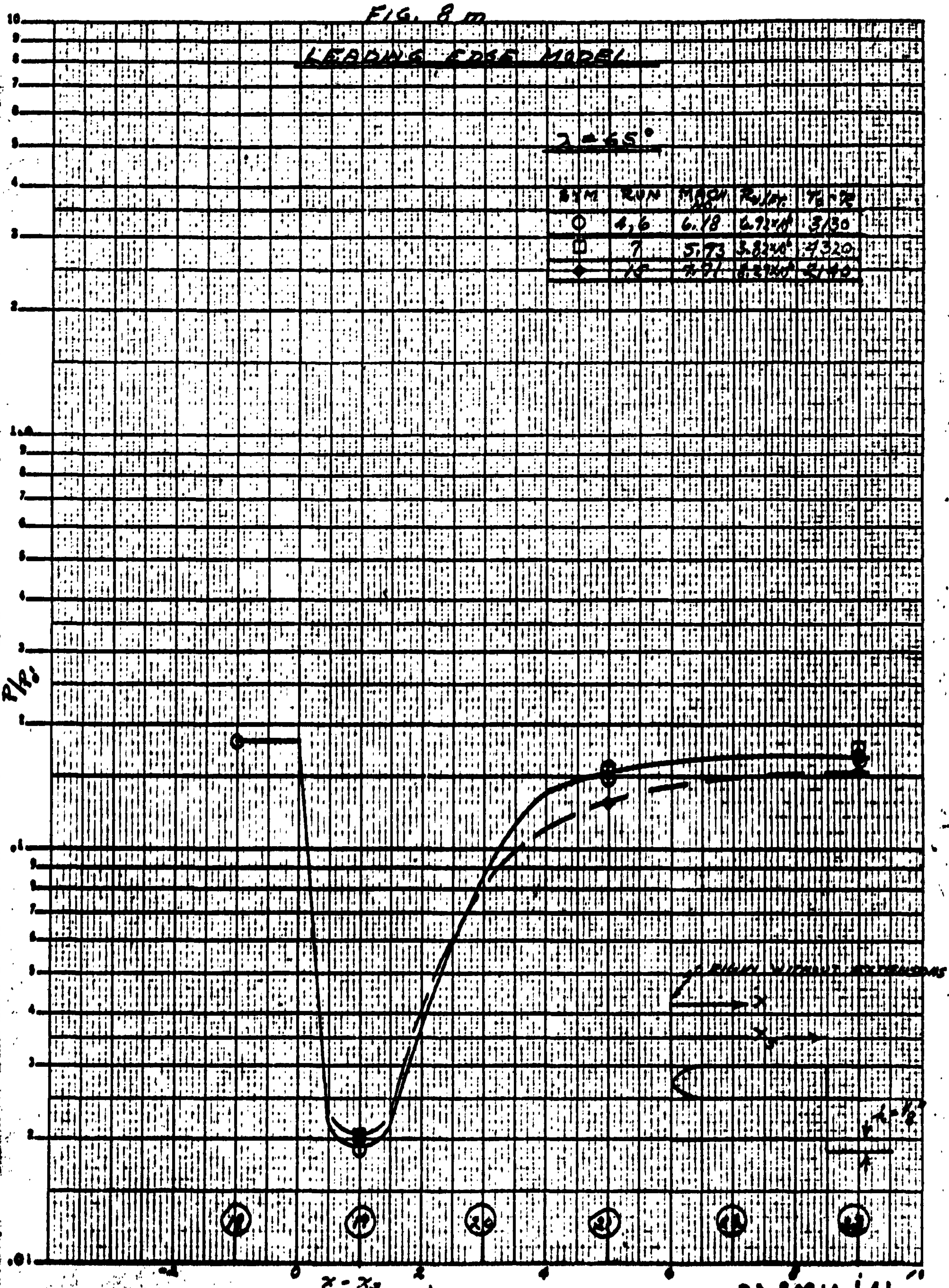

LEADING EDGE MODEL
SYM RUN MACH
4,6 6.18 3130
7 5.73 4320
7.91
P/P0
x - x0
l
DRAWN WITHOUT EXTENSIONS

FIG. 8 m

FIG. 8 n

LEADING EDGE MODEL

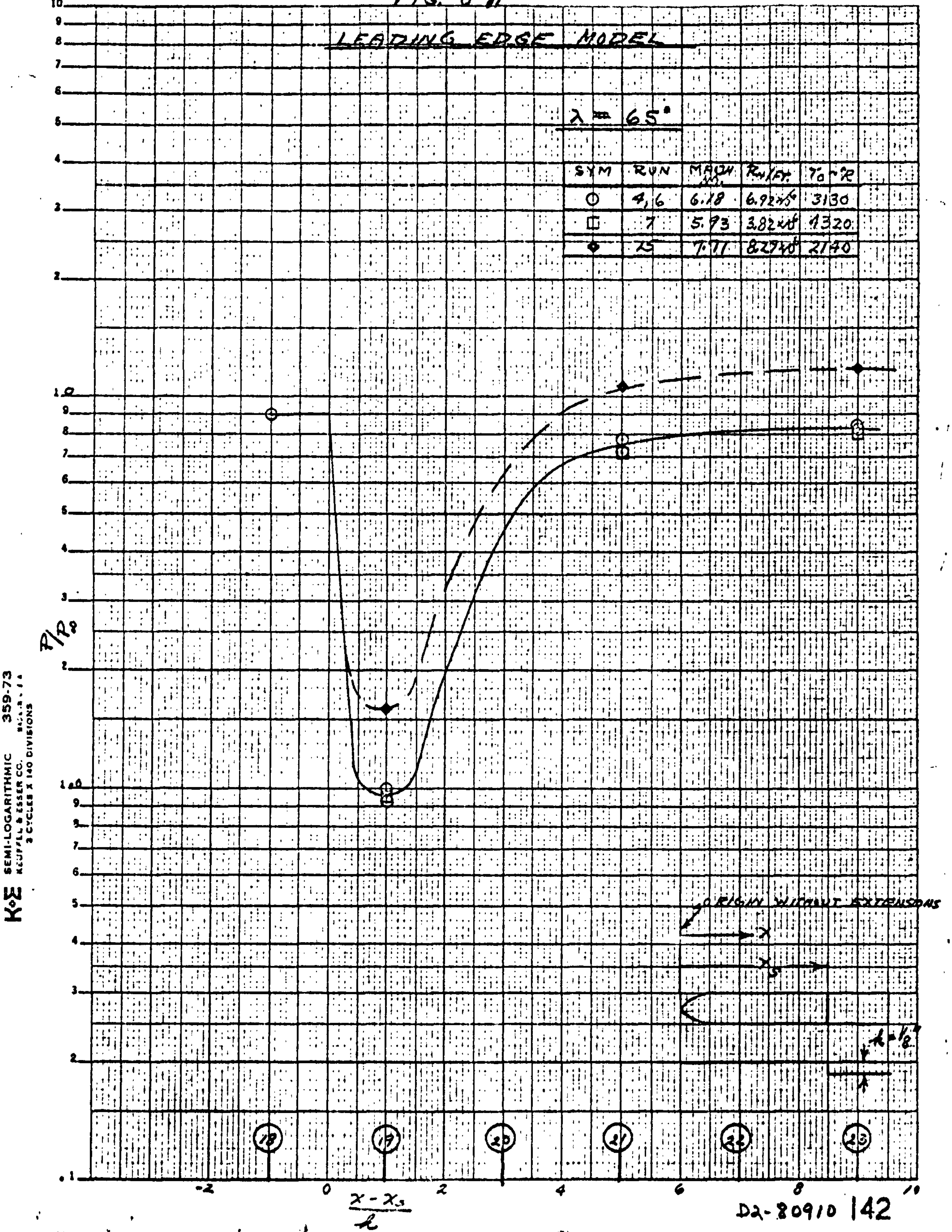
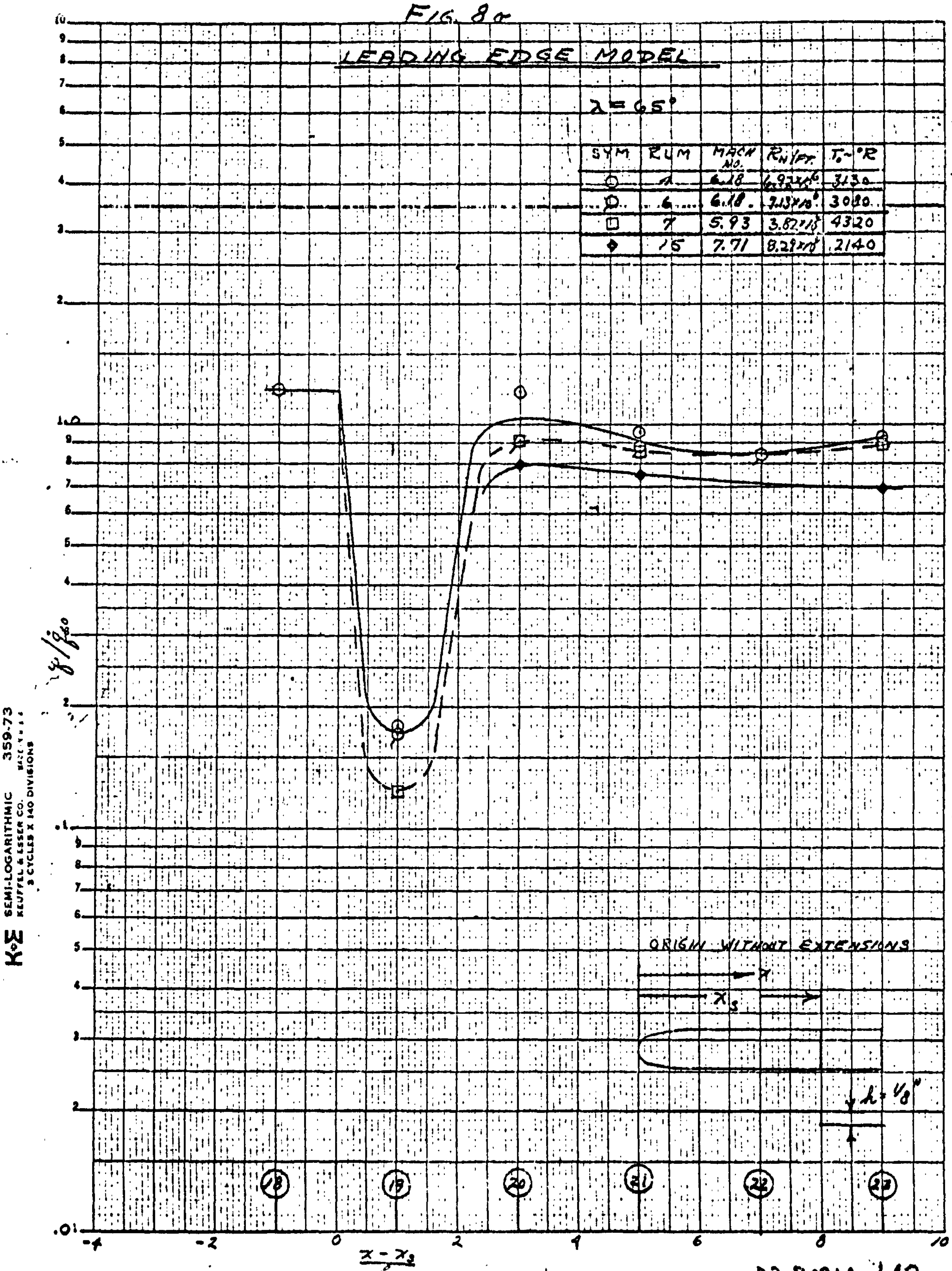


FIG. 8a


LEADING EDGE MODEL
λ = 65°
SYM RUN MACH NO. R_N/FT. T_0 ~ °R
1 6.18 6.92×10^6 3130
6 6.18 7.13×10^6 3080
7 5.93 3.82×10^6 4320
15 7.71 8.29×10^6 2140
ORIGIN WITHOUT EXTENSIONS
x
x_s
h = 1/8"
18
19
20
21
22
23
q/q_{s0}
$\frac{x - x_s}{h}$
-4
-2
0
2
4
6
8
10
K&E SEMI-LOGARITHMIC 359-73
KEUFFEL & ESSER CO.
3 CYCLES X 140 DIVISIONS

EFFECT OF SWEEP ANGLE, λ, ON PRESSURE AND HEAT TRANSFER

DISTRIBUTIONS OVER A BLUNT LEADING EDGE

$M = 7.72$

$R_N/\text{ft.} = 8.3 \times 10^6$

FIGURE 9

FIG. 4a

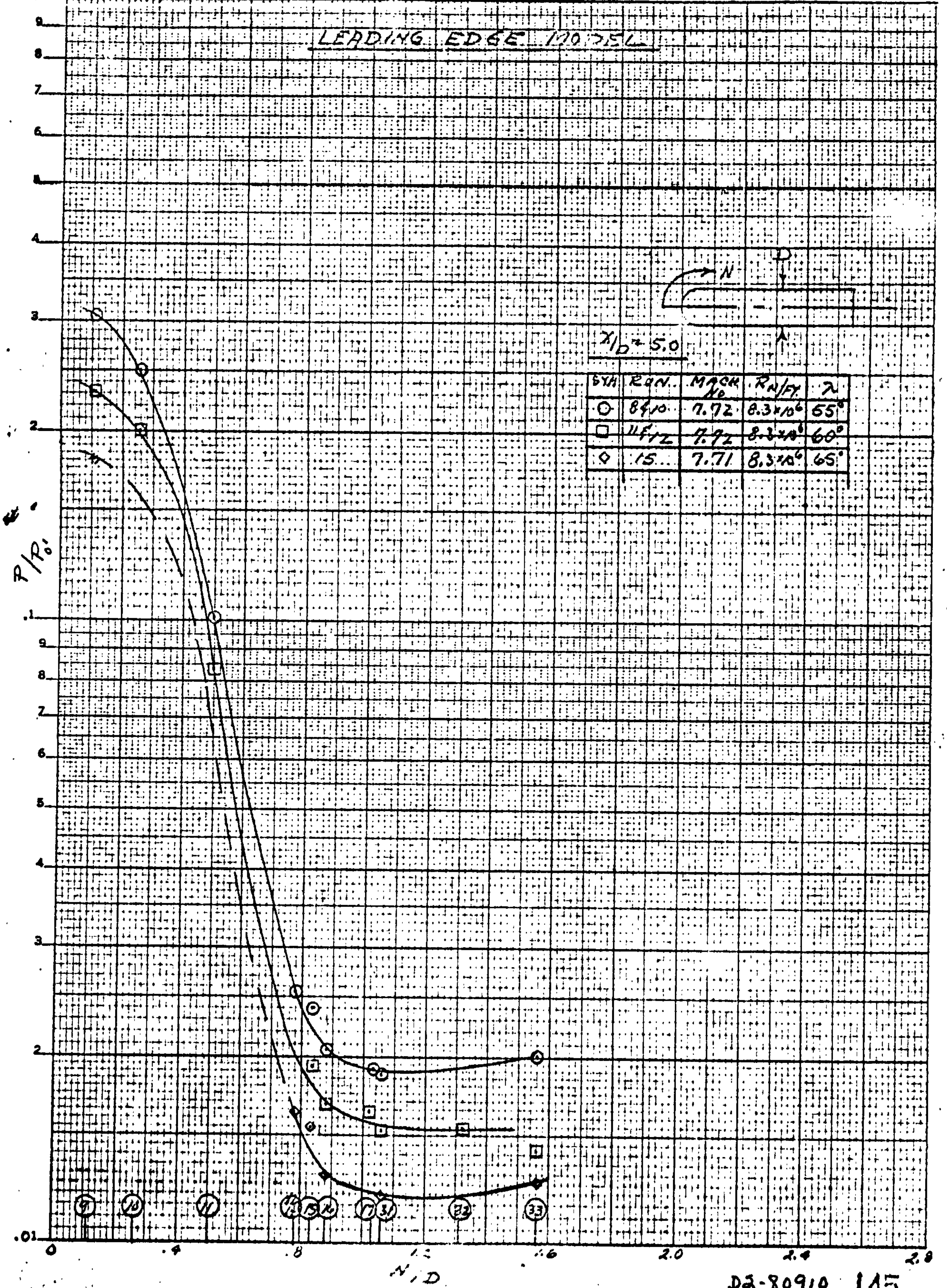

LEADING EDGE MODEL
x/b = 5.0
SYM | RUN | MACH No | RN/FT | λ
○ | 8 & 10 | 7.72 | 8.3×10^6 | 65°
□ | 11 & 12 | 7.72 | 8.3×10^6 | 60°
◇ | 15 | 7.71 | 8.3×10^6 | 65°
N
D
P/P0'
N/D
K&E SEMI-LOGARITHMIC 359-63
KEUFFEL & ESSER CO.
2 CYCLES X 140 DIVISIONS

FIG. 96

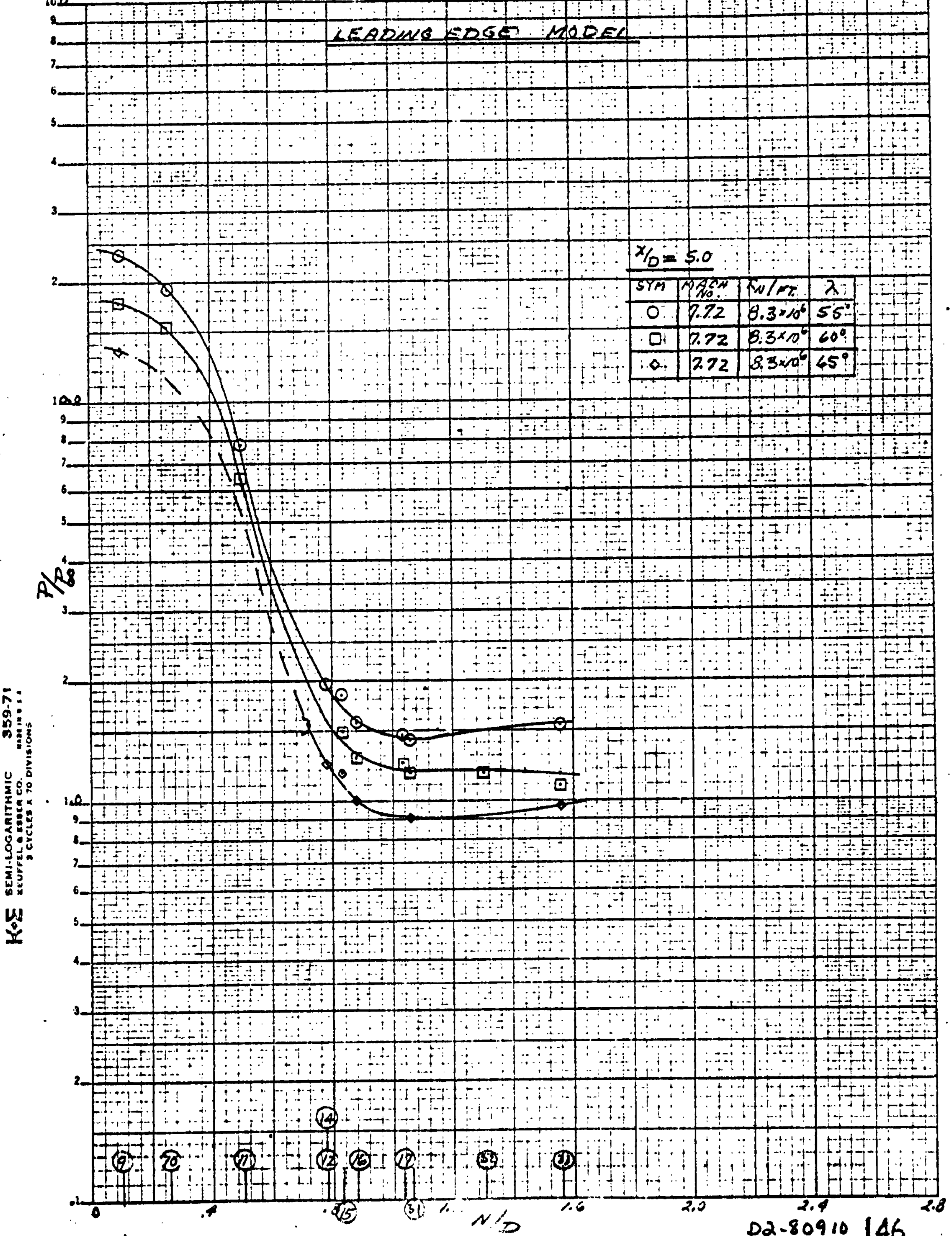

LEADING EDGE MODEL
X/D = 5.0
SYM | MACH NO. | RN/FT. | λ
○ | 7.72 | 8.3×10^6 | 55°
□ | 7.72 | 8.3×10^6 | 60°
◇ | 7.72 | 8.3×10^6 | 65°
P/P∞
N/D
0
.4
1.6
2.0
2.4
2.8
K&E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

FIG. 9c

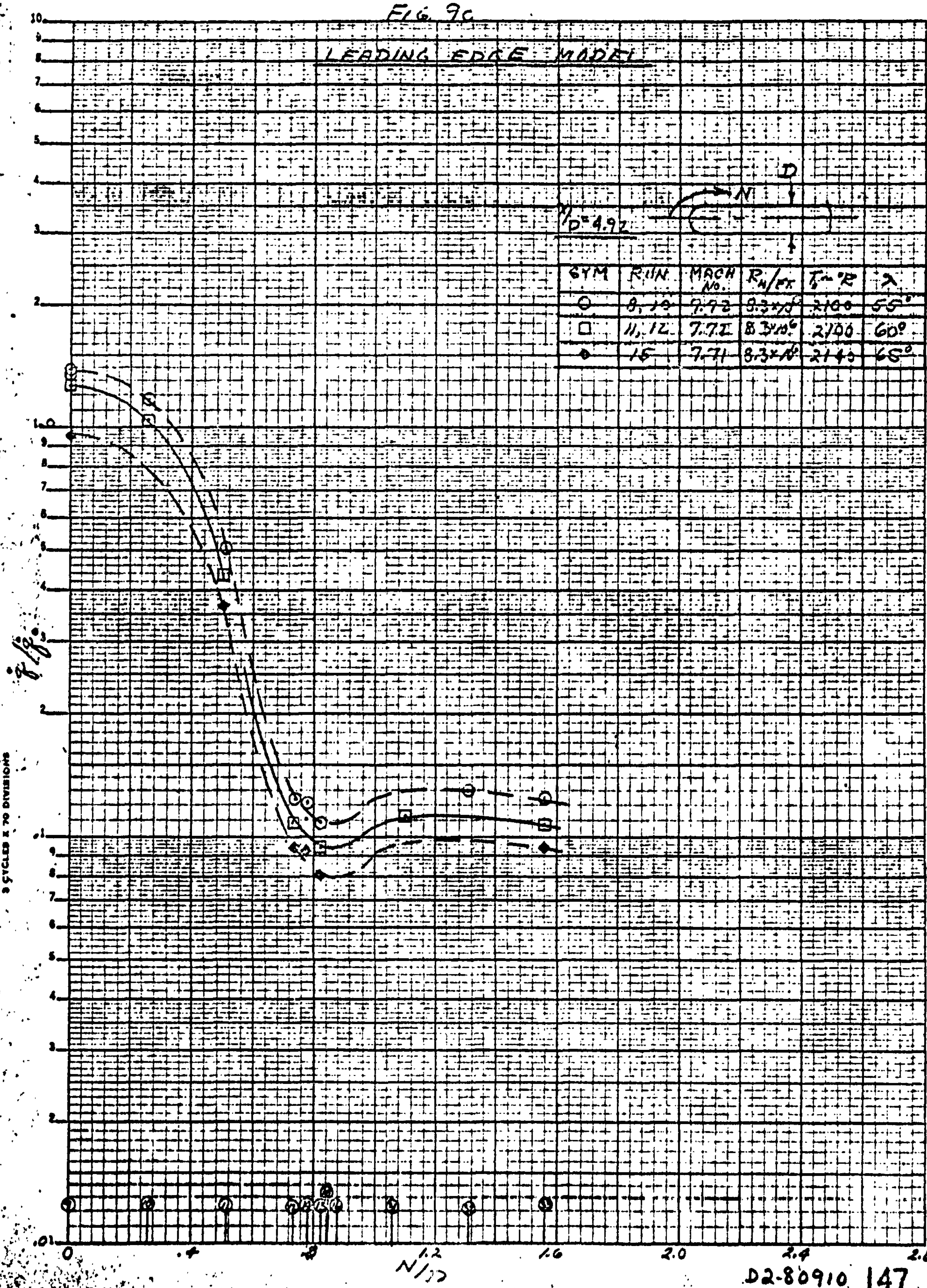

LEADING EDGE MODEL
l/D = 4.92
N
D
SYM | RUN | MACH NO. | R_N/FT | T_0 ~ °R | λ
○ | 9, 10 | 7.72 | 8.3×10⁶ | 2100 | 55°
□ | 11, 12 | 7.72 | 8.3×10⁶ | 2100 | 60°
◆ | 15 | 7.71 | 8.3×10⁶ | 2140 | 65°
q/q_o
N/D
0
.4
.8
1.2
1.6
2.0
2.4
2.8
.01
.1
1.0
10

FIG. 9.L

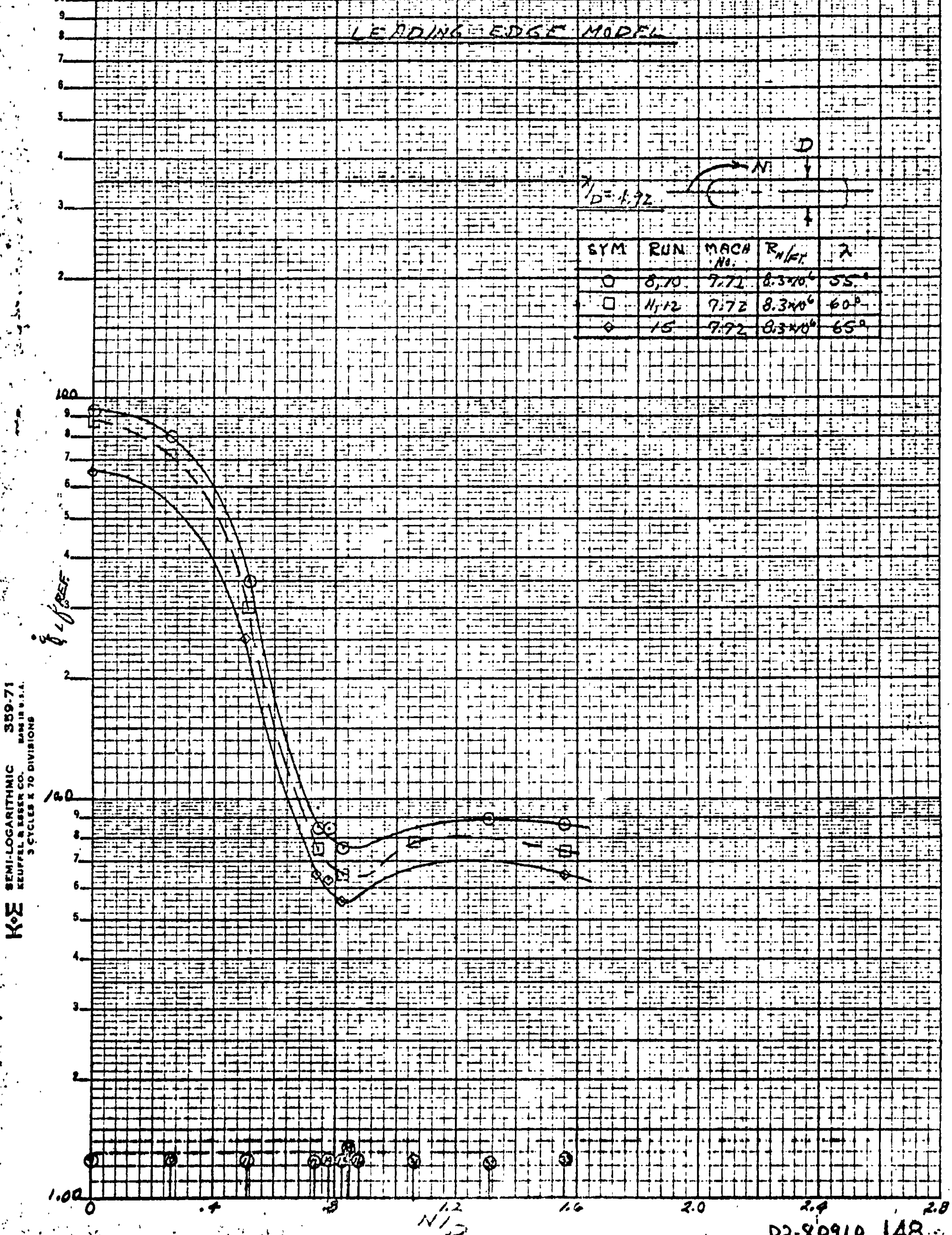

LEADING EDGE MODEL
X/D = 1.92
N
D
SYM RUN MACH No. R_N/FT. λ
○ 8,10 7.72 8.3×10^6 55°
□ 11,12 7.72 8.3×10^6 60°
◇ 15 7.72 8.3×10^6 65°
$\dot{q}_L / \dot{q}_{REF}$
N/D
0 .4 .8 1.2 1.6 2.0 2.4 2.8
1.00 10.0 100
K&E SEMI-LOGARITHMIC 359-71 KEUFFEL & ESSER CO. MADE IN U.S.A. 3 CYCLES X 70 DIVISIONS

FIG. 9e

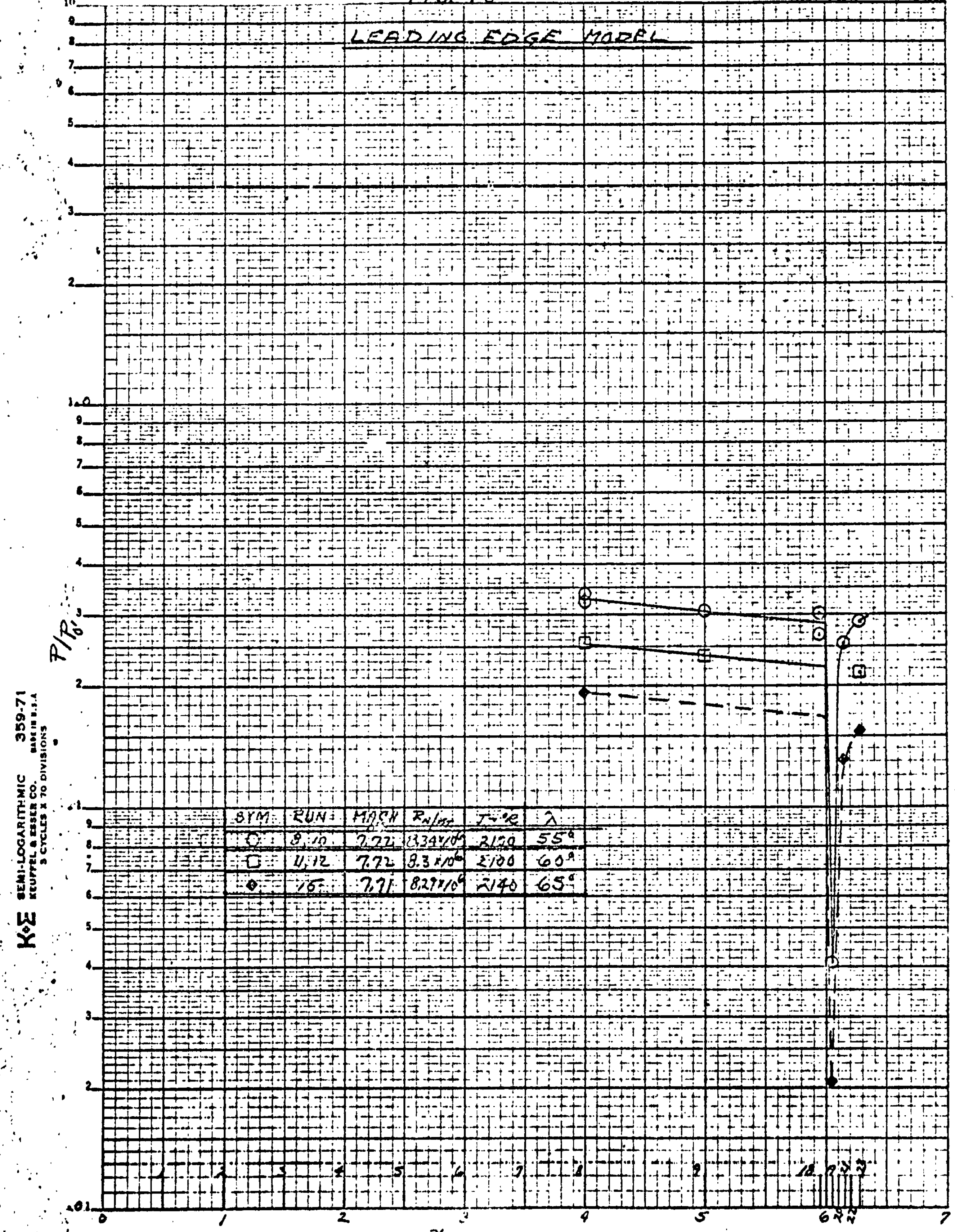

LEADING EDGE MODEL
P/P₀
X/D
SYM RUN MACH R_N/FT T-°R λ
○ 9,10 7.72 8.34x10^6 2120 55°
□ 11,12 7.72 8.3x10^6 2100 60°
◆ 16 7.71 8.29x10^6 2140 65°
K&E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 9f

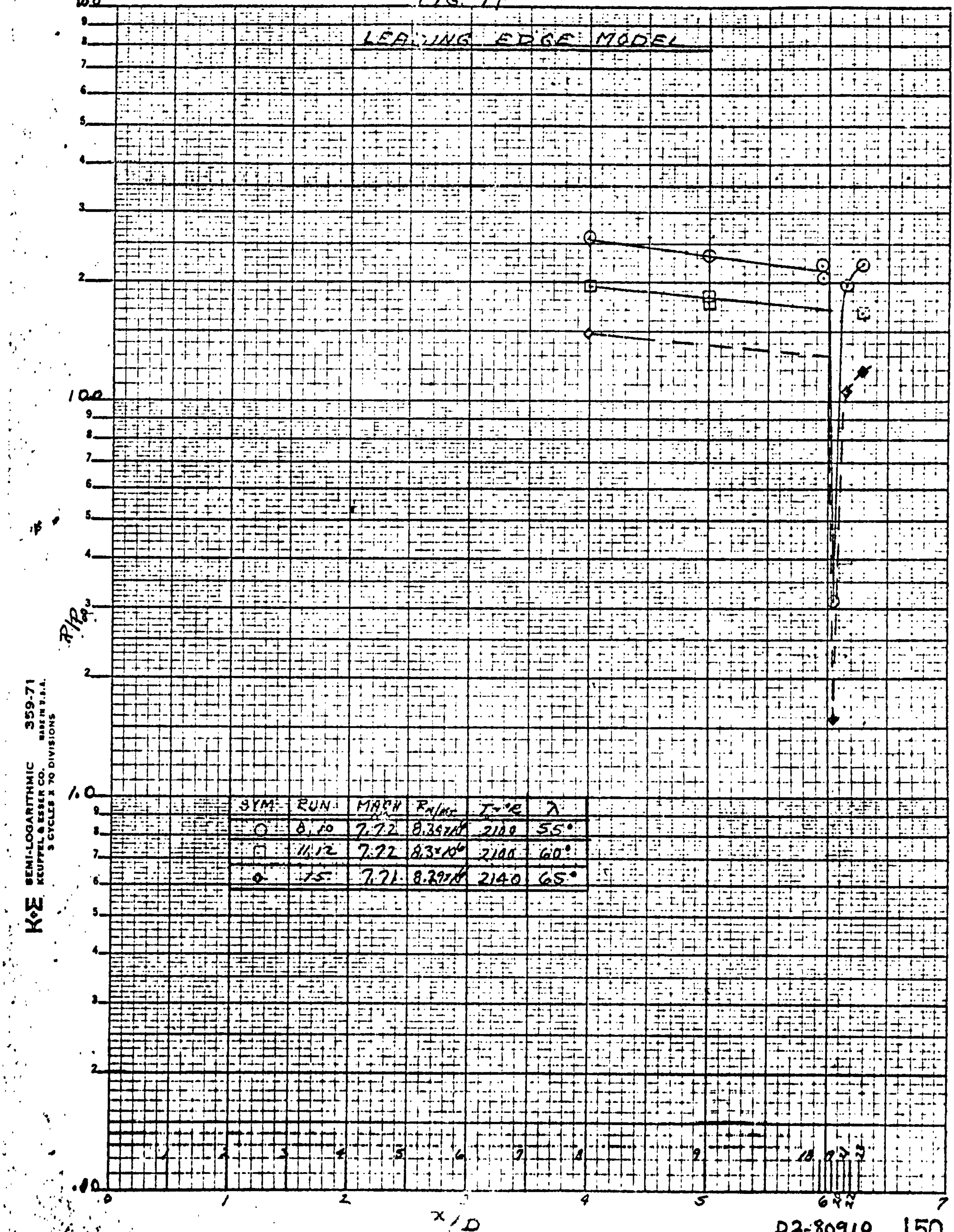

LEADING EDGE MODEL
SYM RUN MACH R_{N}/FT T_{T} °R λ
○ 8,10 7.72 8.39×10⁶ 2100 55°
□ 11,12 7.72 8.3×10⁶ 2100 60°
◇ 15 7.71 8.29×10⁶ 2140 65°
P/P∞
x/D
K+E SEMI-LOGARITHMIC 359-71 KEUFFEL & ESSER CO. MADE IN U.S.A. 3 CYCLES X 70 DIVISIONS

FIG. 9g

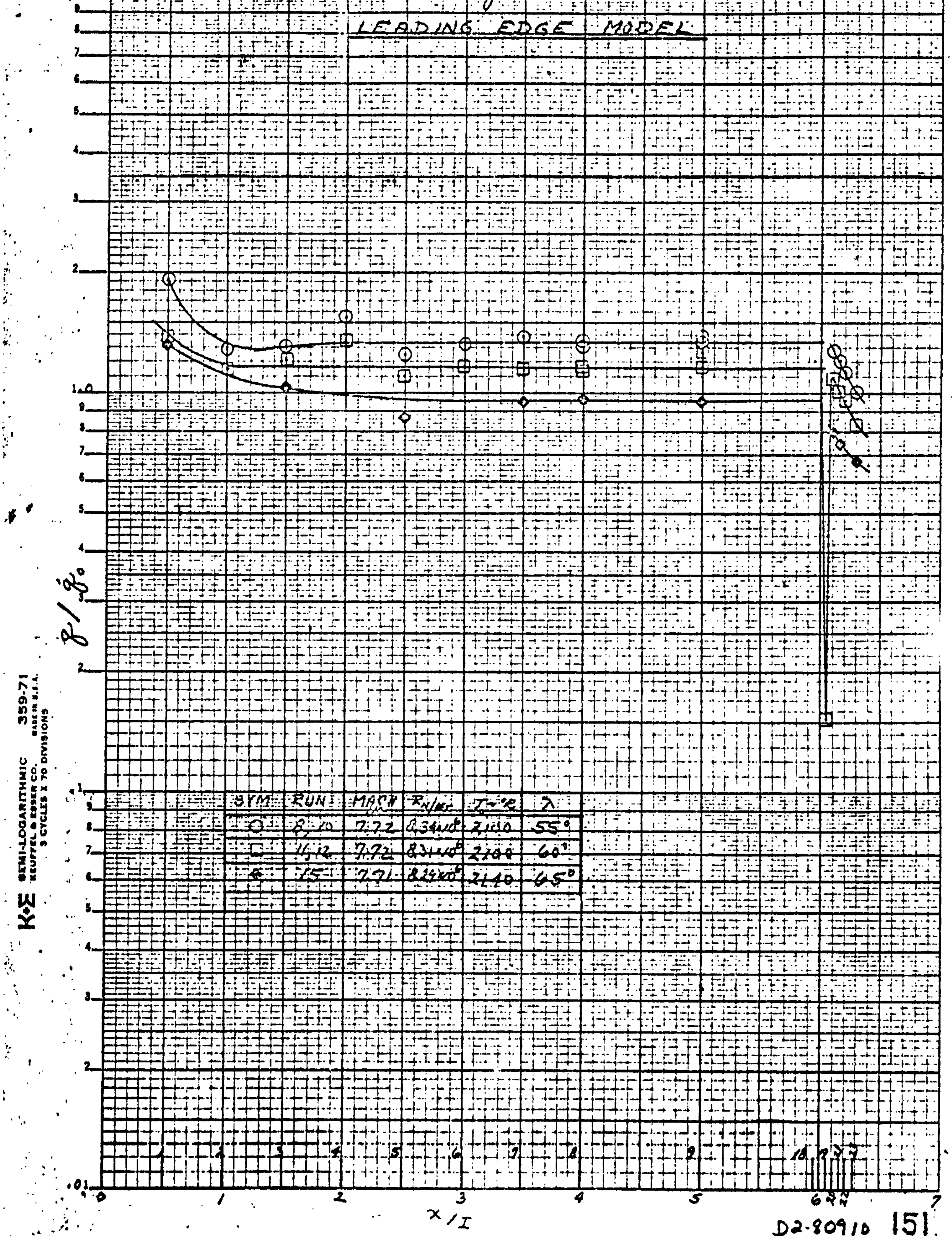
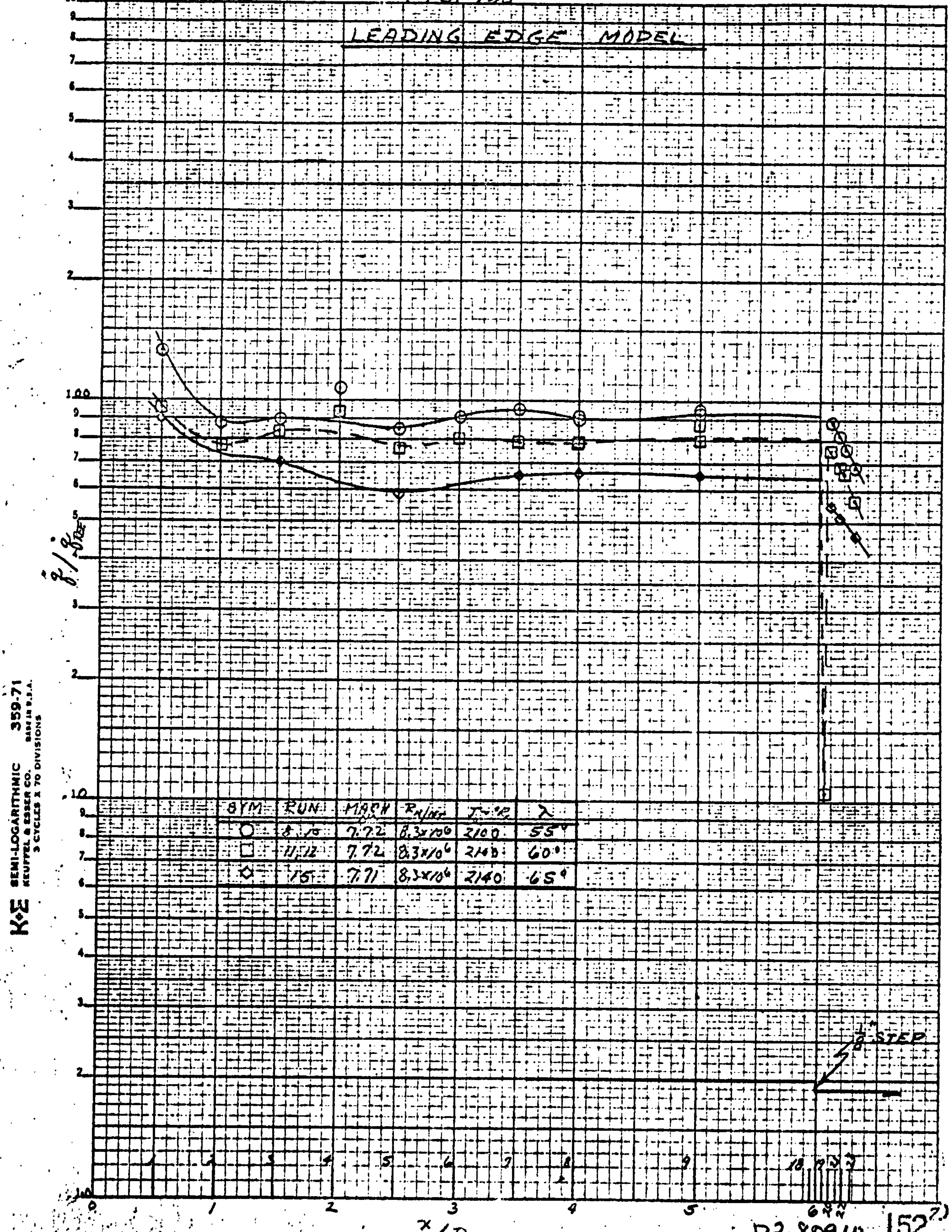

LEADING EDGE MODEL
q/q_o
x/l
SYM RUN MACH R_N/FT T_o ~°R λ
8, 10 7.72 8.34x10^6 2100 55°
11, 12 7.72 8.31x10^6 2100 60°
15 7.71 8.24x10^6 2140 65°
K·E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 9L


LEADING EDGE MODEL
SYM RUN MACH R_N/FT T~°R λ
○ 8,10 7.72 8.3×10^6 2100 55°
□ 11,12 7.72 8.3×10^6 2140 60°
◇ 15 7.71 8.3×10^6 2140 65°
$\dot{q}/\dot{q}_{RE}$
x/D
1/8" STEP
K+E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

EFFECT OF SWEEP ANGLE, λ, ON PRESSURE AND HEAT TRANSFER DISTRIBUTIONS OVER A BLUNT LEADING EDGE

$M = 15.17$

$R_N/ft. = 1.2 \times 10^5$

FIGURE 10

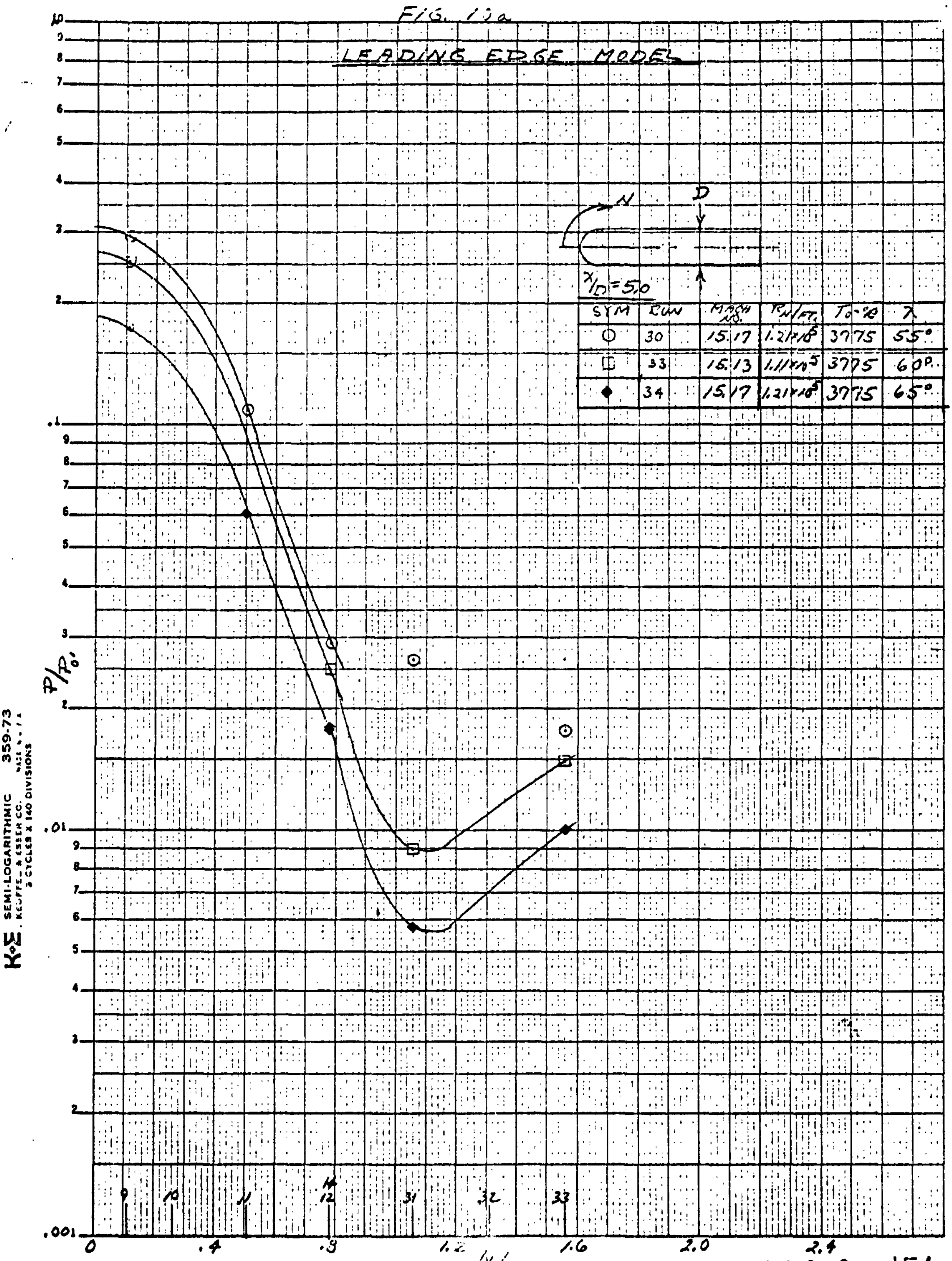


FIG. 13a
LEADING EDGE MODEL
N
D
x/D = 5.0
SYM RUN MACH NO. RN/FT. T0-°R λ
○ 30 15.17 1.21×10^5 3775 55°
□ 33 15.13 1.11×10^5 3775 60°
◆ 34 15.17 1.21×10^5 3775 65°
P/P0'
N/D
0 .4 .8 1.2 1.6 2.0 2.4
9 10 11 12 31 32 33
K&E SEMI-LOGARITHMIC 359-73
KEUFFEL & ESSER CO.
3 CYCLES X 140 DIVISIONS

FIG. 10 b

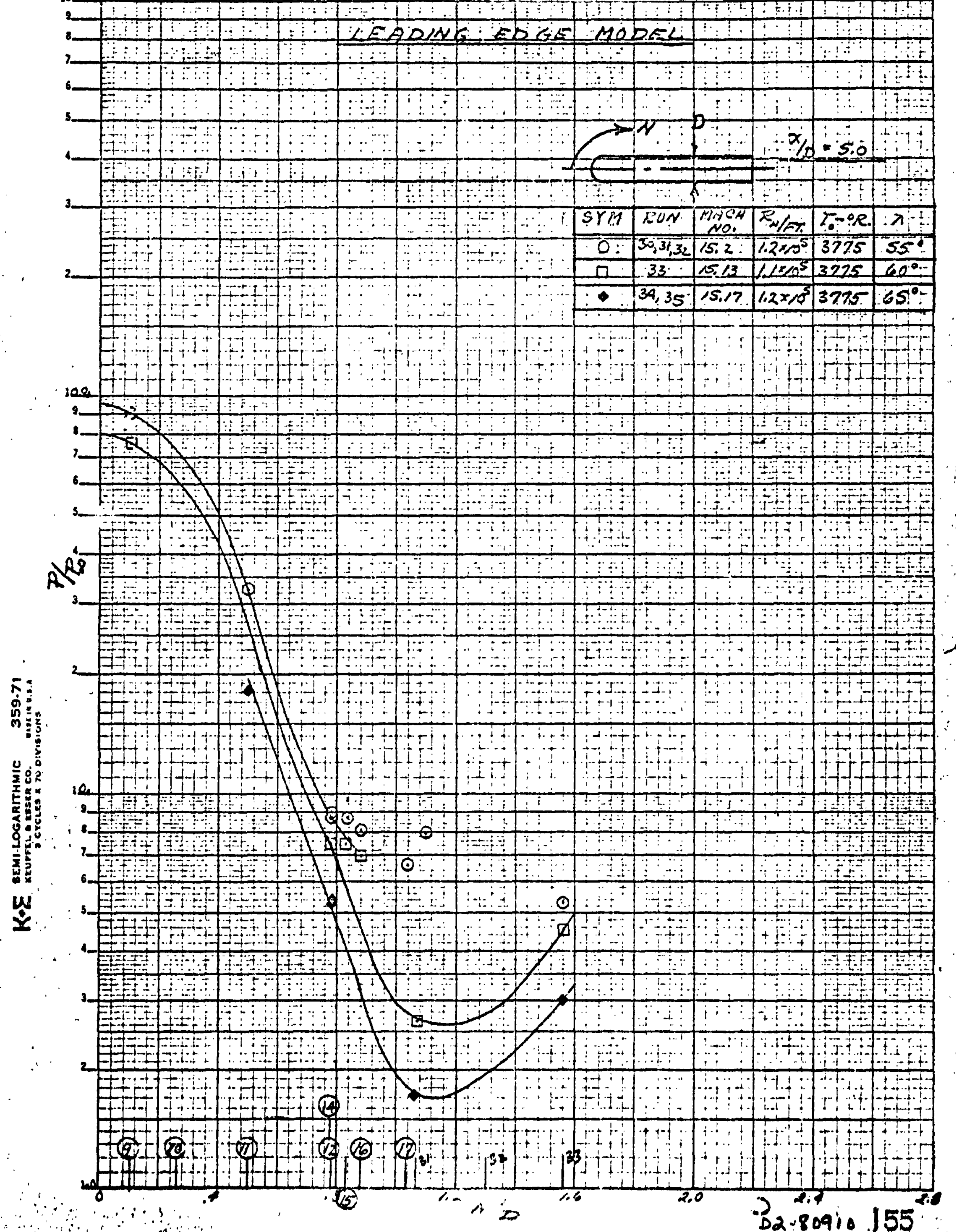

LEADING EDGE MODEL
N
D
x/D = 5.0
SYM | RUN | MACH NO. | R_N/FT. | T_o-°R. | Λ
○ | 30,31,32 | 15.2 | 1.2×10^5 | 3775 | 55°
□ | 33 | 15.13 | 1.1×10^5 | 3775 | 60°
◆ | 34,35 | 15.17 | 1.2×10^5 | 3775 | 65°
P/P_o
h/D
KE SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 10a

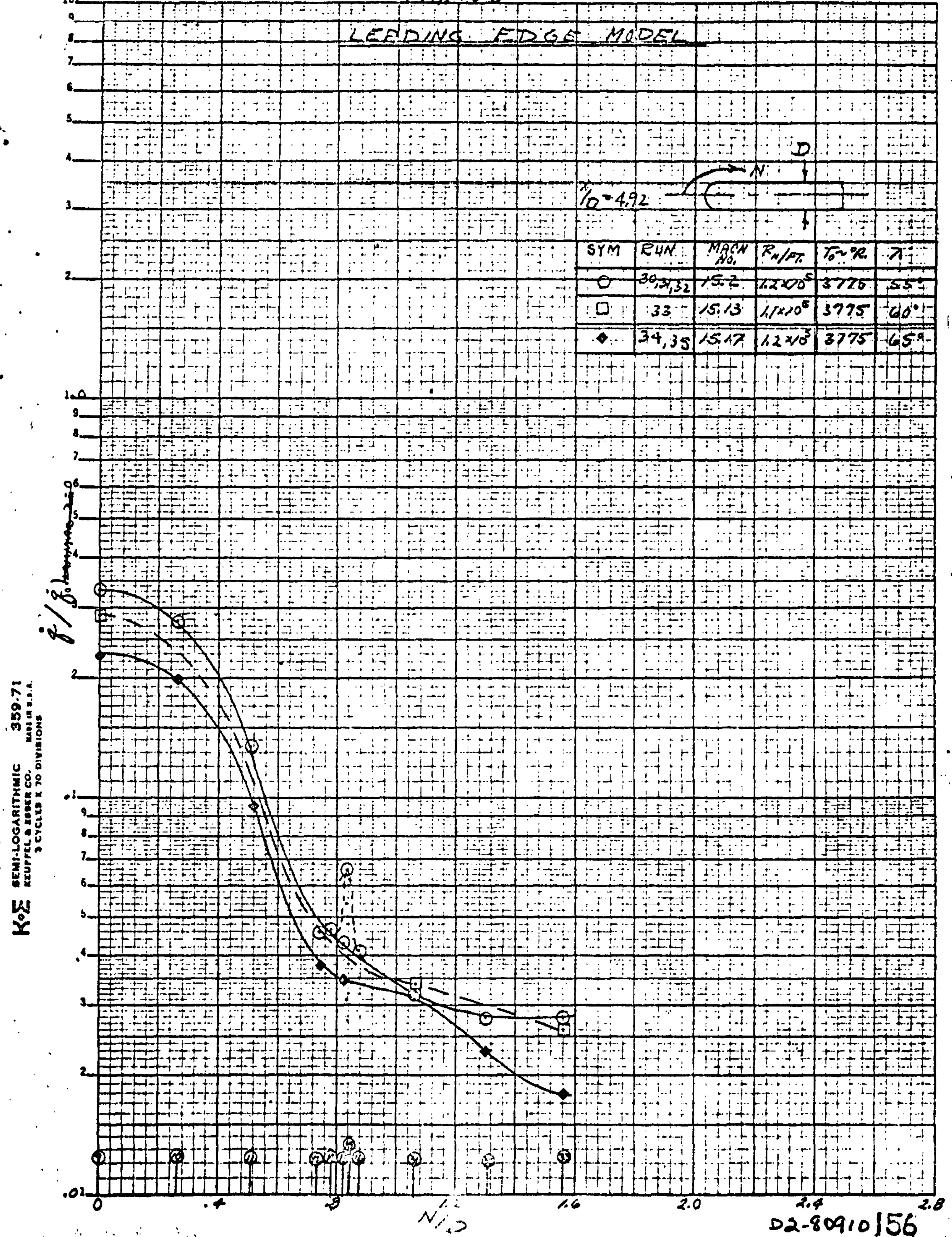
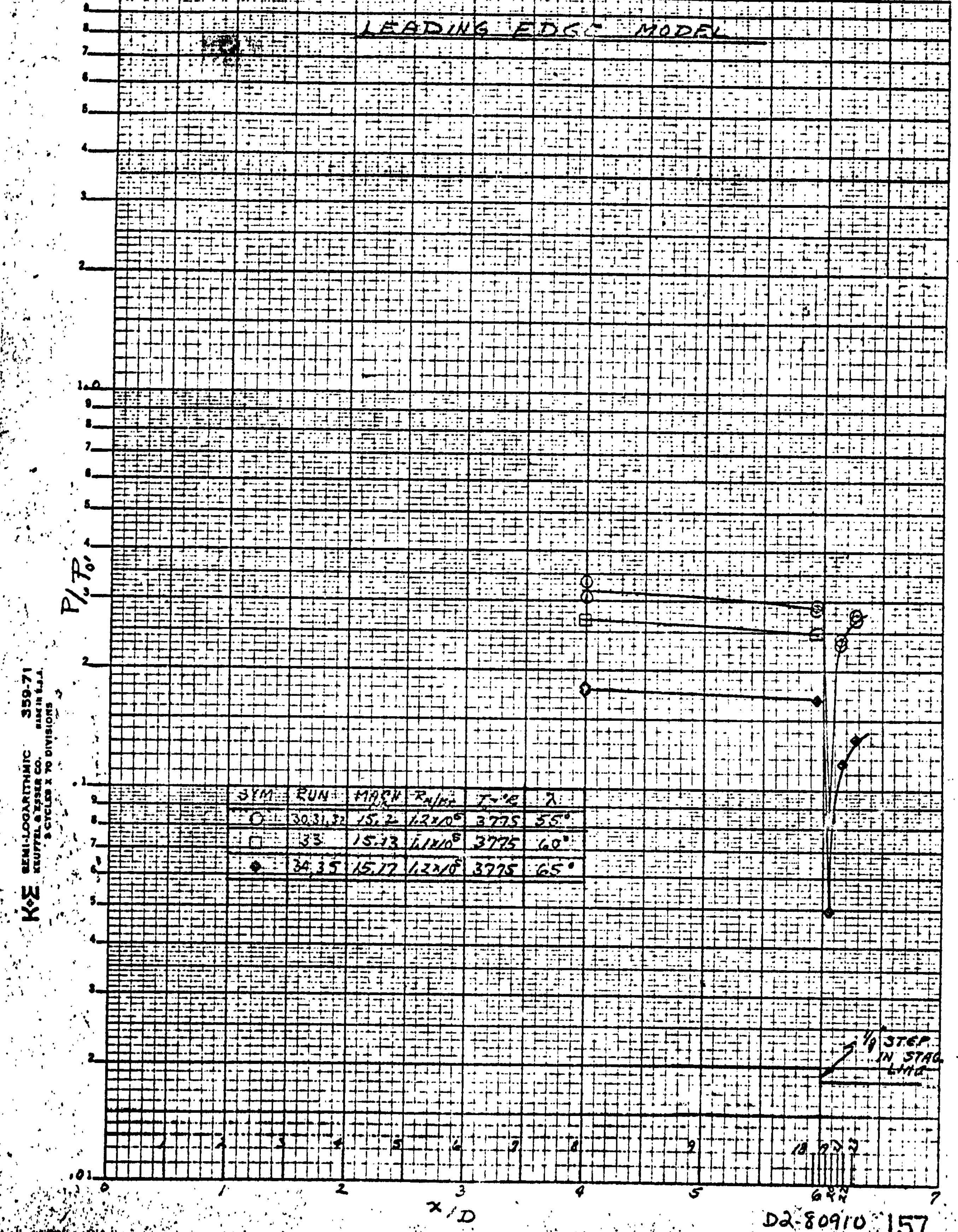
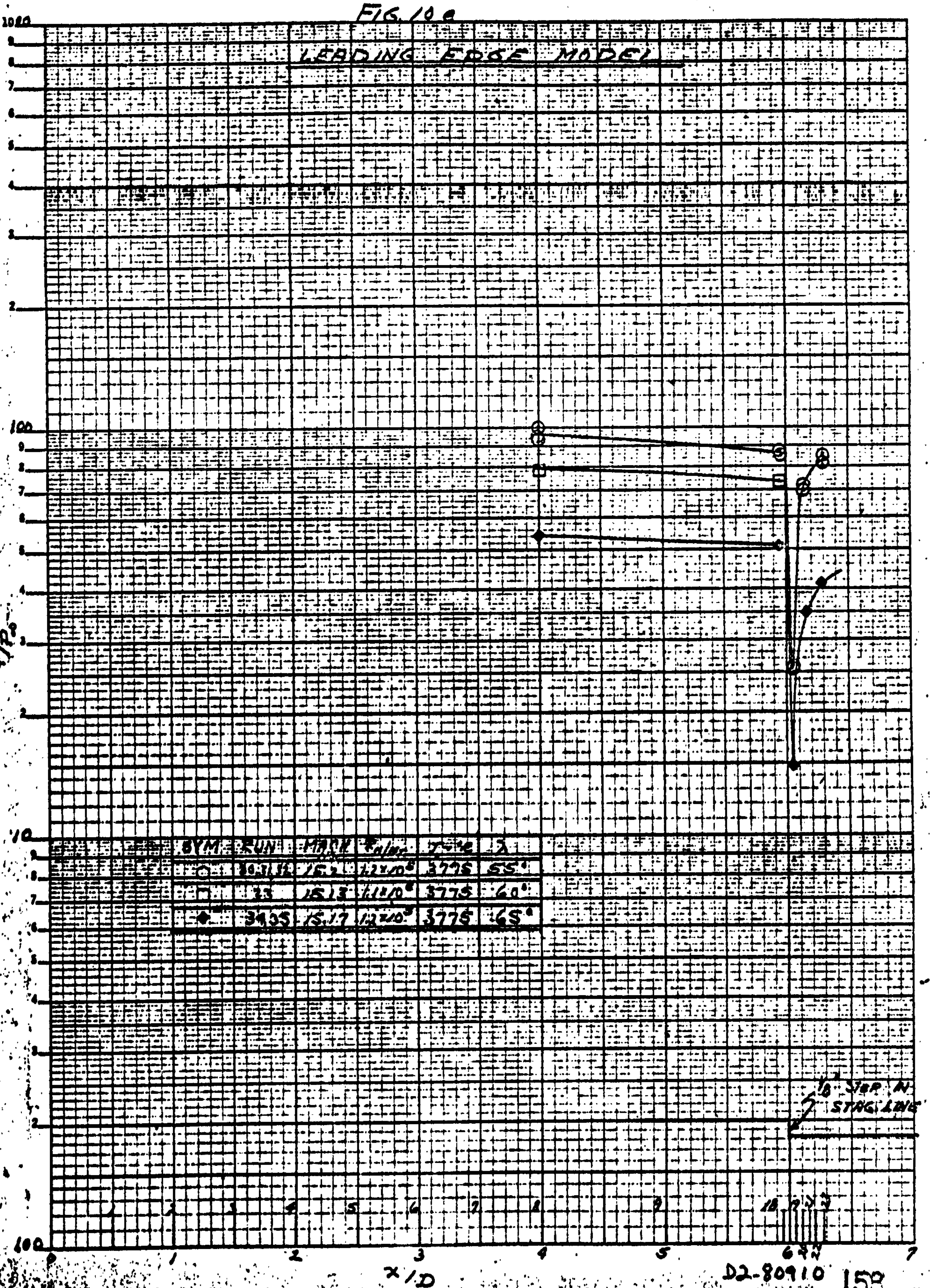

LEADING EDGE MODEL
X/D = 4.92
N
D
SYM | RUN | MACH NO. | R_N/FT. | T_0 ~ °R. | λ
○ | 30,31,32 | 15.2 | 1.2×10^5 | 3775 | 55°
□ | 33 | 15.13 | 1.1×10^5 | 3775 | 60°
◆ | 34,35 | 15.17 | 1.2×10^5 | 3775 | 65°
$\dot{q}/\dot{q}_0$
N/D
0
.4
.8
1.2
1.6
2.0
2.4
2.8
K&E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 10d



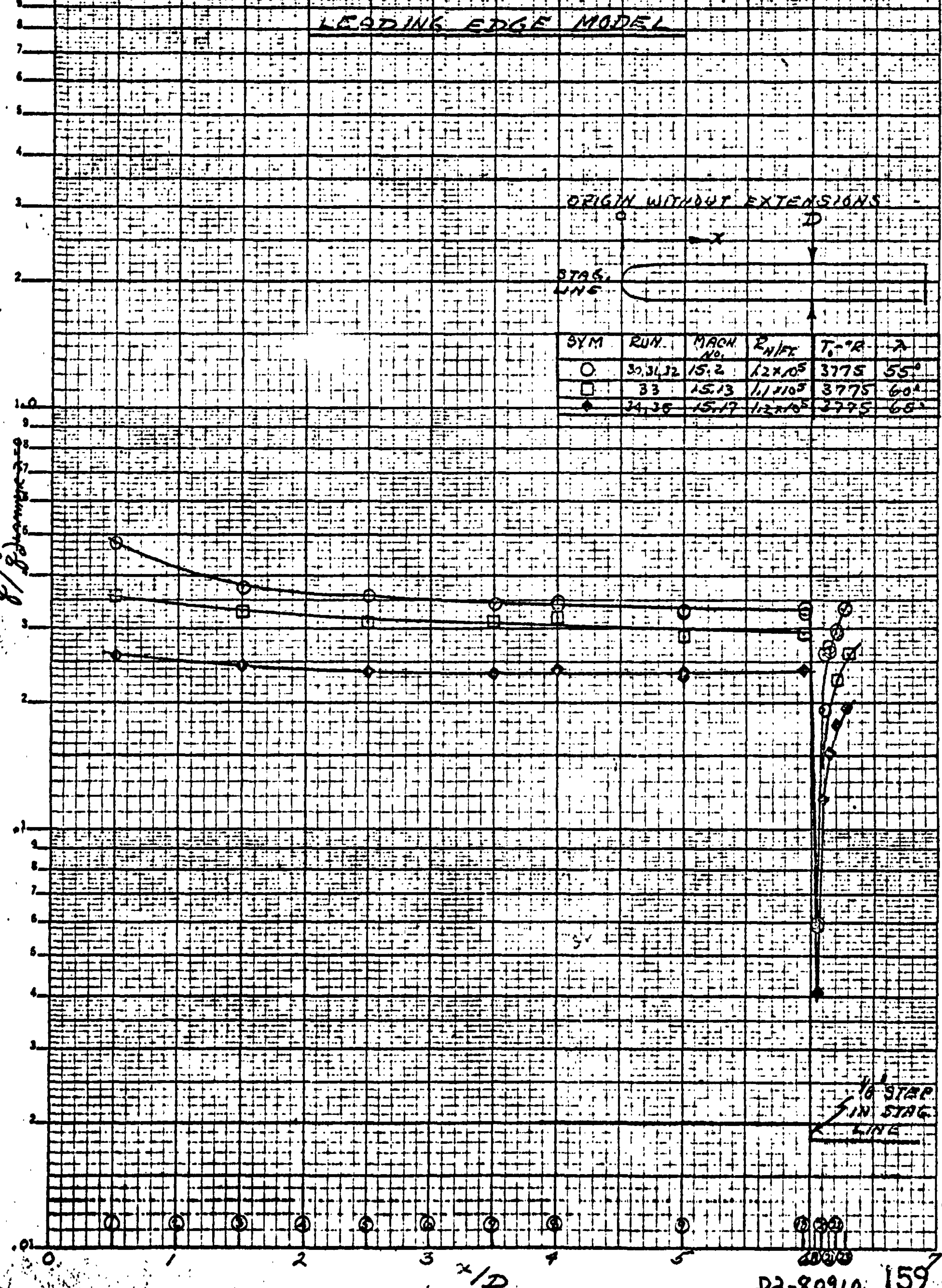
LEADING EDGE MODEL
P/P0'
x/D
SYM RUN MACH R N/FT T ~ °R λ
30,31,32 15.2 1.2x10^6 3775 55°
33 15.13 1.1x10^6 3775 60°
34,35 15.17 1.2x10^6 3775 65°
1/8 STEP IN STAG. LINE
K+E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 10 e



LEADING EDGE MODEL
SYM RUN MACH T₀ λ
30,31,32 15.2 1.2×10⁵ 3775 55°
33 15.13 1.1×10⁶ 3775 60°
3435 15.17 1.2×10⁵ 3775 65°
1/8" STEP IN STAG LINE
P/P₀
X/D
K+E SEMI-LOGARITHMIC 359-71

FIG. 10 f



K&E SEMI-LOGARITHMIC 359-71 KEUFFEL & ESSER CO. MADE IN U.S.A. 3 CYCLES X 70 DIVISIONS

EFFECT OF ANGLE OF ATTACK ON THE PRESSURE AND HEAT TRANSFER DISTRIBUTIONS OVER A HEMISPHERE CYLINDER

$M_{\infty} \approx 6.4$

$R_N/ft. \approx 14 \times 10^6$

$\phi = 180^\circ$

FIGURE 11

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FIG 11a

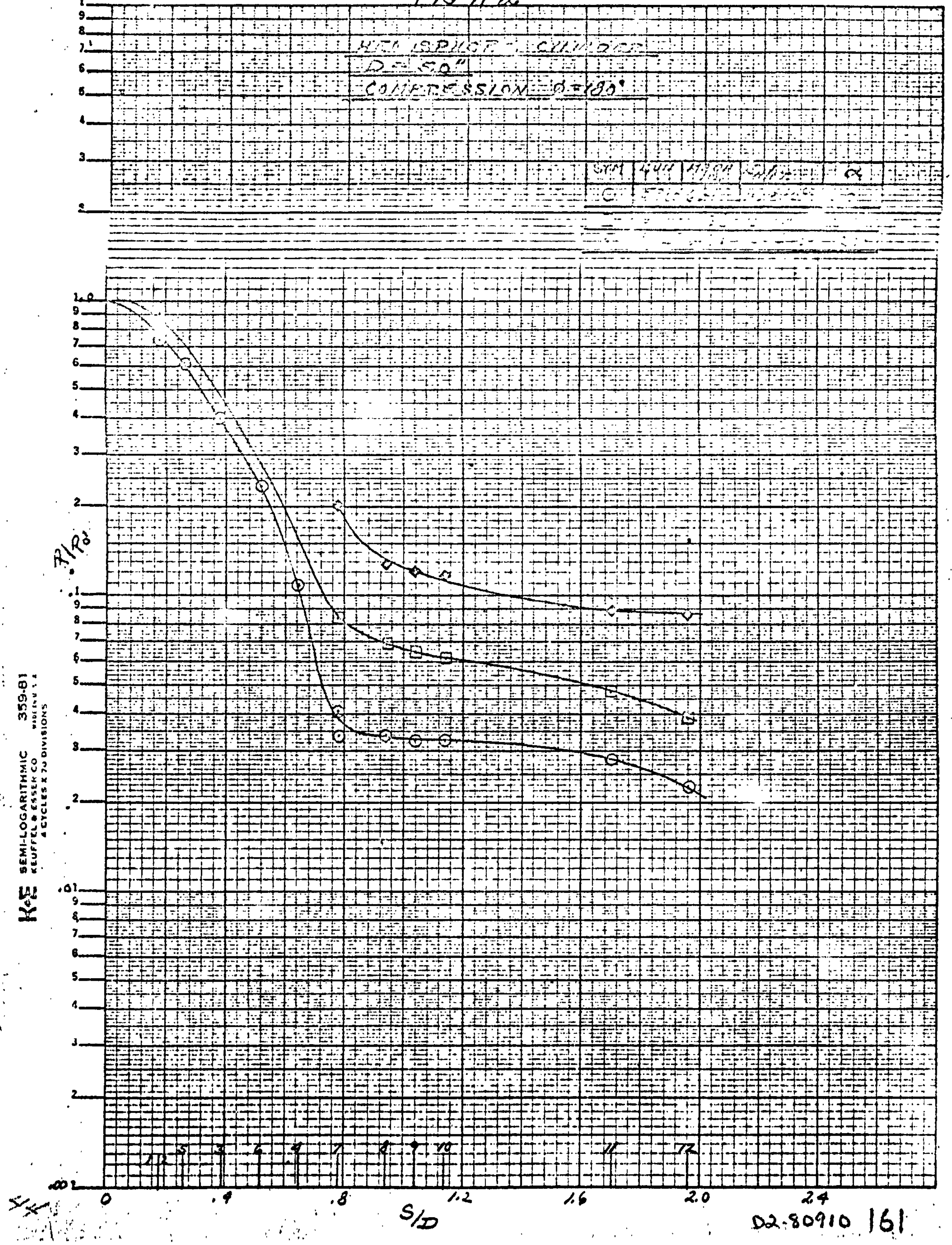
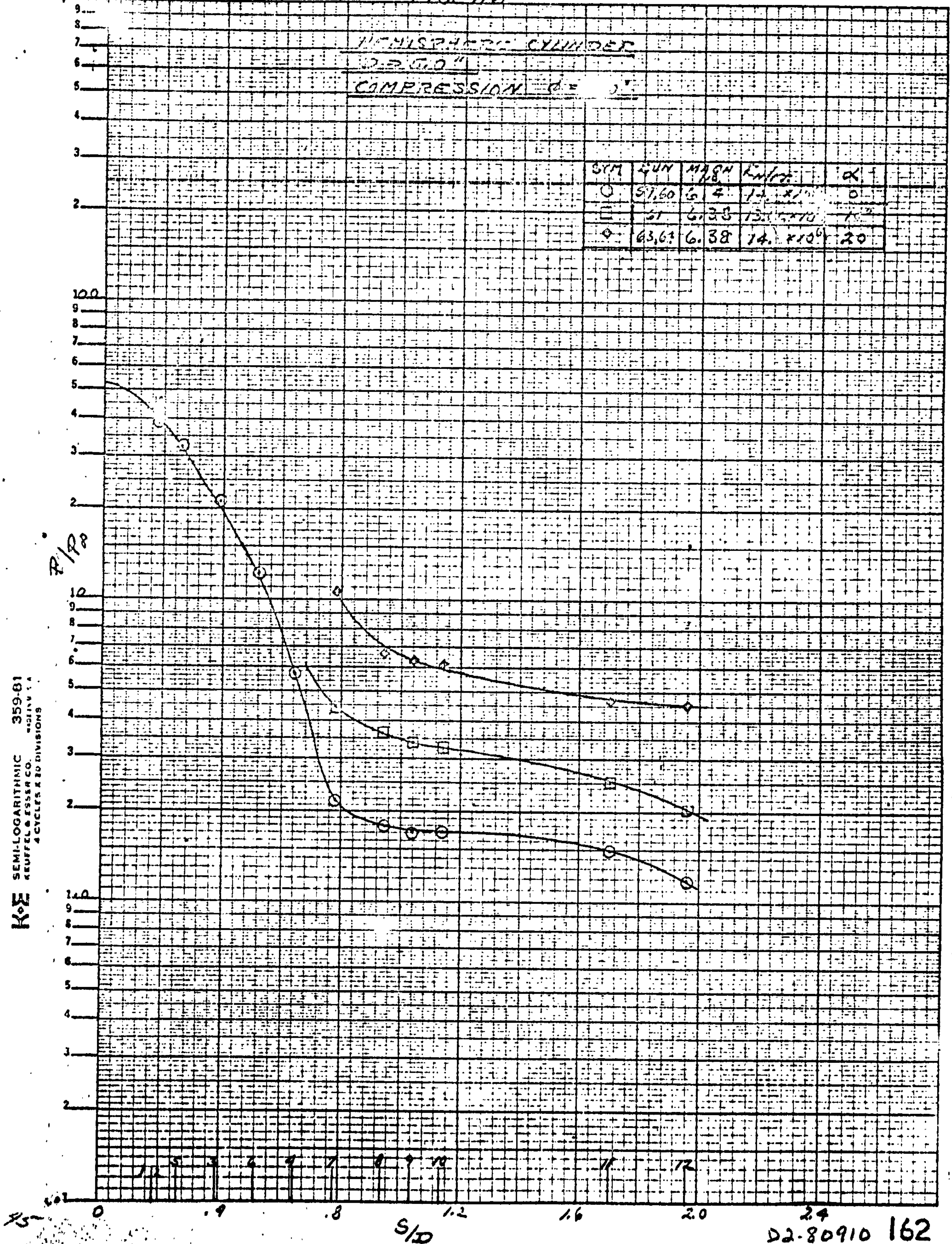
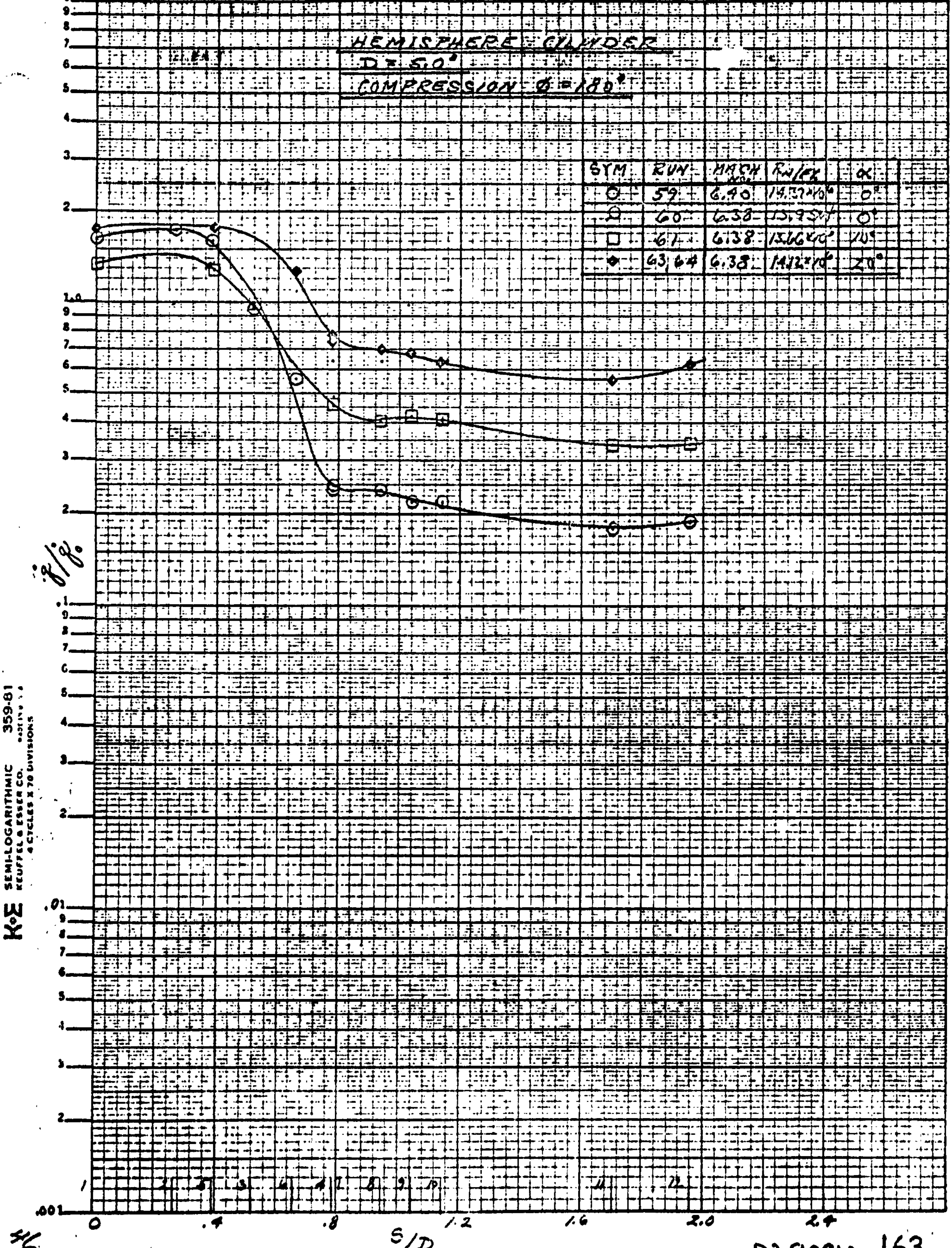

HEMISPHERE - CYLINDER
D = 5.0"
COMPRESSION φ = 180°
P/Po
S/D
0
.4
.8
1.2
1.6
2.0
2.4
SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 11b



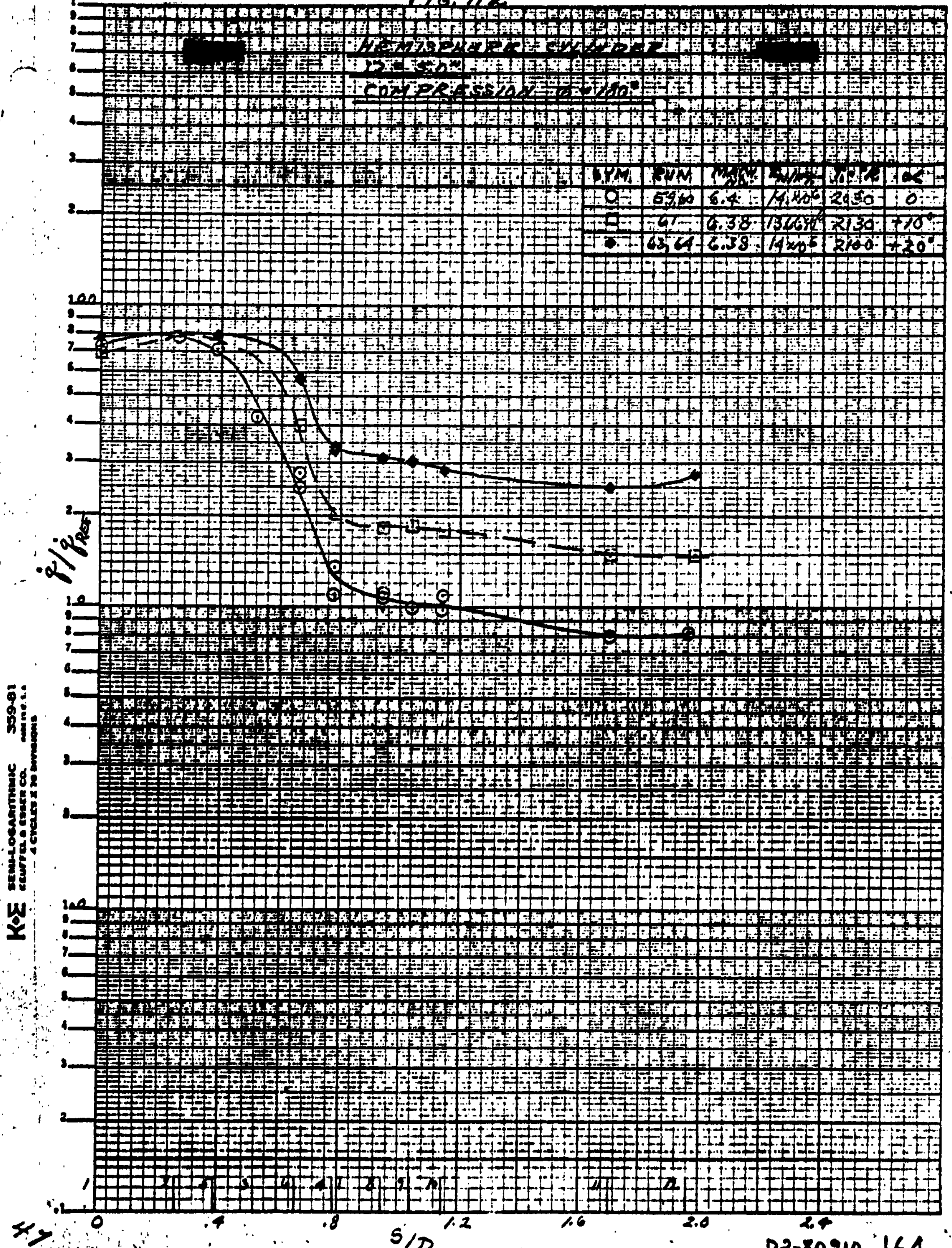
CYLINDER
COMPRESSION
SYM GUN MACH α
57,60 6.4 0
61 6.38
63,61 6.38 14. ×10⁶ 20
0
.4
.8
1.2
1.6
2.0
2.4
S/D
KE SEMI-LOGARITHMIC 359-81

FIG. 11c


HEMISPHERE CYLINDER
D = 5.0"
COMPRESSION Ø = 180°
SYM RUN MACH NO. Rn/Ft α
59 6.40 0°
60 6.38 0°
61 6.38 10°
63, 64 6.38 20°
q/q₀
S/D
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

4/6

FIG. 11d


[redacted]
COMPRESSION
SYM RUN MACH
59,60 6.4 2130 0
61 6.38 2130 +10°
63,64 6.38 2100 +20°
q/q_REF
0 .4 .8 1.2 1.6 2.0 2.4
S/D
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

EFFECT OF ANGLE OF ATTACK ON THE PRESSURE AND HEAT TRANSFER DISTRIBUTION OVER A HEMISPHERE CYLINGER

$M \approx 14.8$

$R\ /ft. \approx 6 \times 10^4$

$\phi = 180°$

FIGURE 12

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FIG. 12a

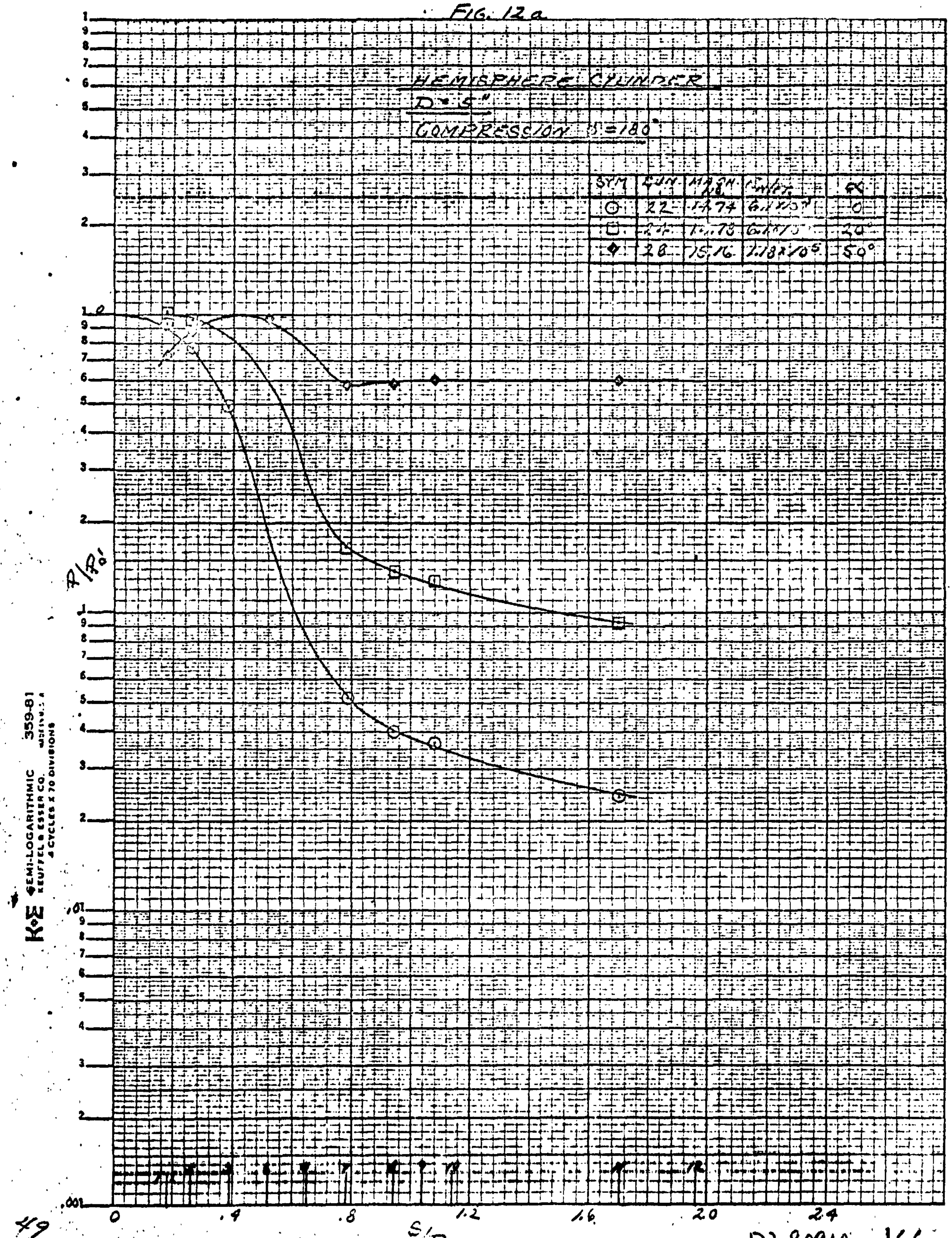

HEMISPHERE CYLINDER
D = 5"
COMPRESSION β = 180°
SYM RUN MACH NO.
22 14.74 0°
28 15.16 1.18×10^5 50°
20°
P/P_o'
S/D
0
.4
.8
1.2
1.6
2.0
2.4
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 12b

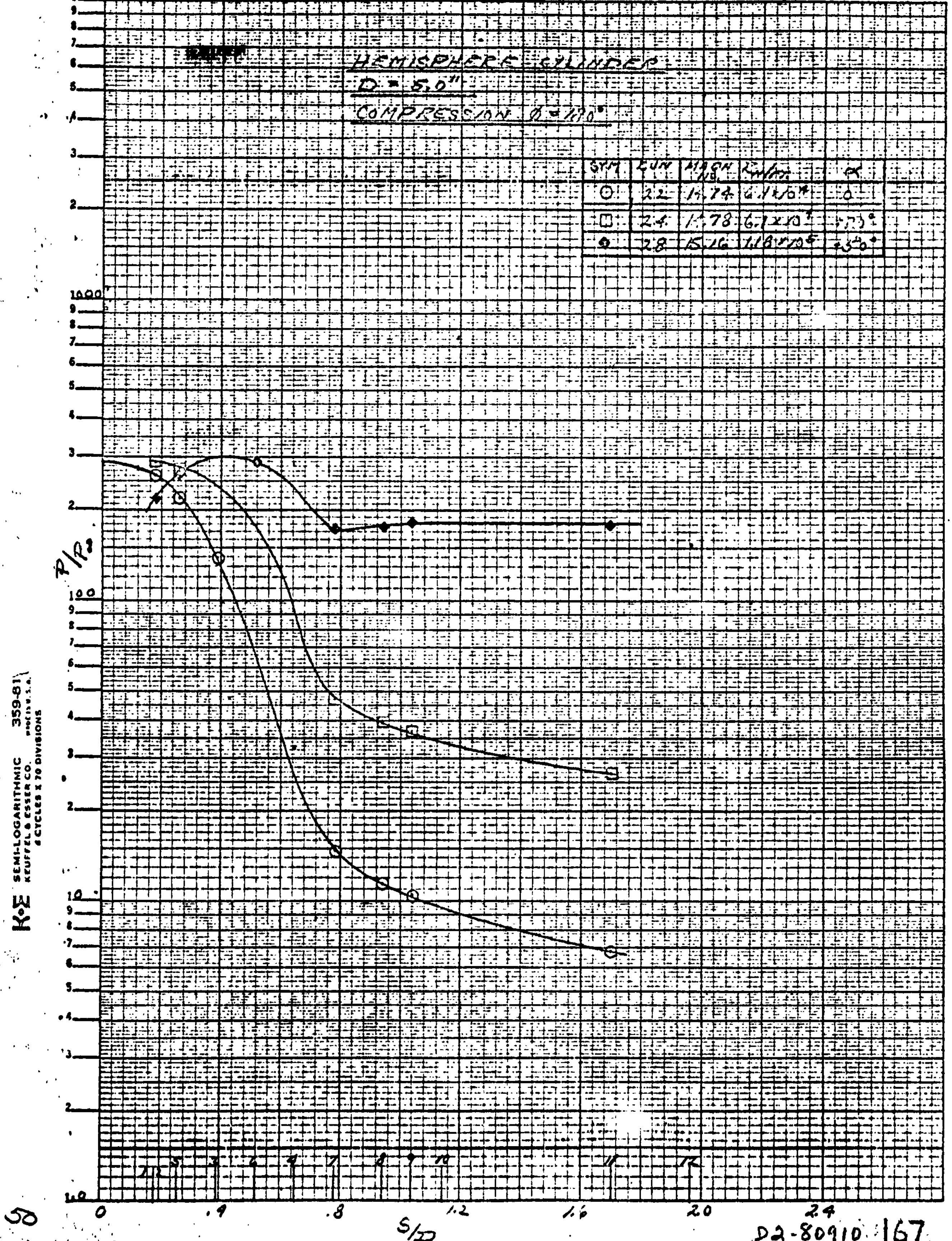
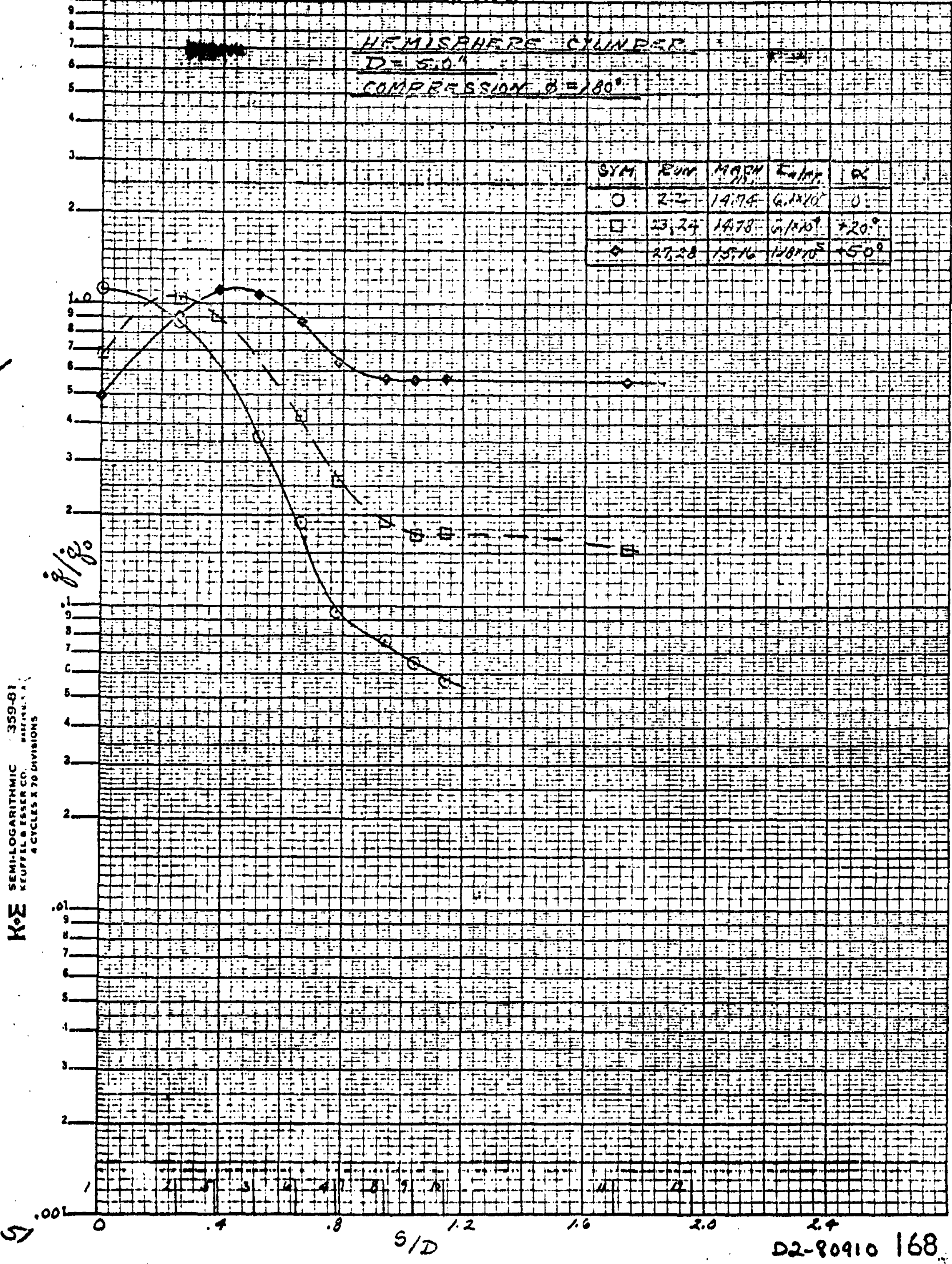

HEMISPHERE CYLINDER
D = 5.0"
COMPRESSION ø = 180°
SYM RUN MACH NO. Re/in. α
22 1.74 6.1x10^4 0
24 1.78 6.1x10^4
28 15.16 1.18x10^5 +5.0°
P/P∞
S/D
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 12C



HEMISPHERE CYLINDER
D = 5.0"
COMPRESSION φ = 180°
SYM RUN MACH α
○ 22 14.74 0
□ 23,24 14.78 +20°
◇ 27,28 15.16 +50°
q/q₀
S/D
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

EFFECT OF VARIATIONS IN TEST CONDITIONS ON THE PRESSURE AND

HEAT TRANSFER DISTRIBUTION OVER A HEMISPHERE CYLINDER

AT $\alpha = 0^\circ$

$M_\infty = 5.6 \rightarrow 6.4$

$R_N/\text{ft.} = 2.22 \times 10^6 \rightarrow 14.37 \times 10^6$

FIGURE 13

FIG. 13 a

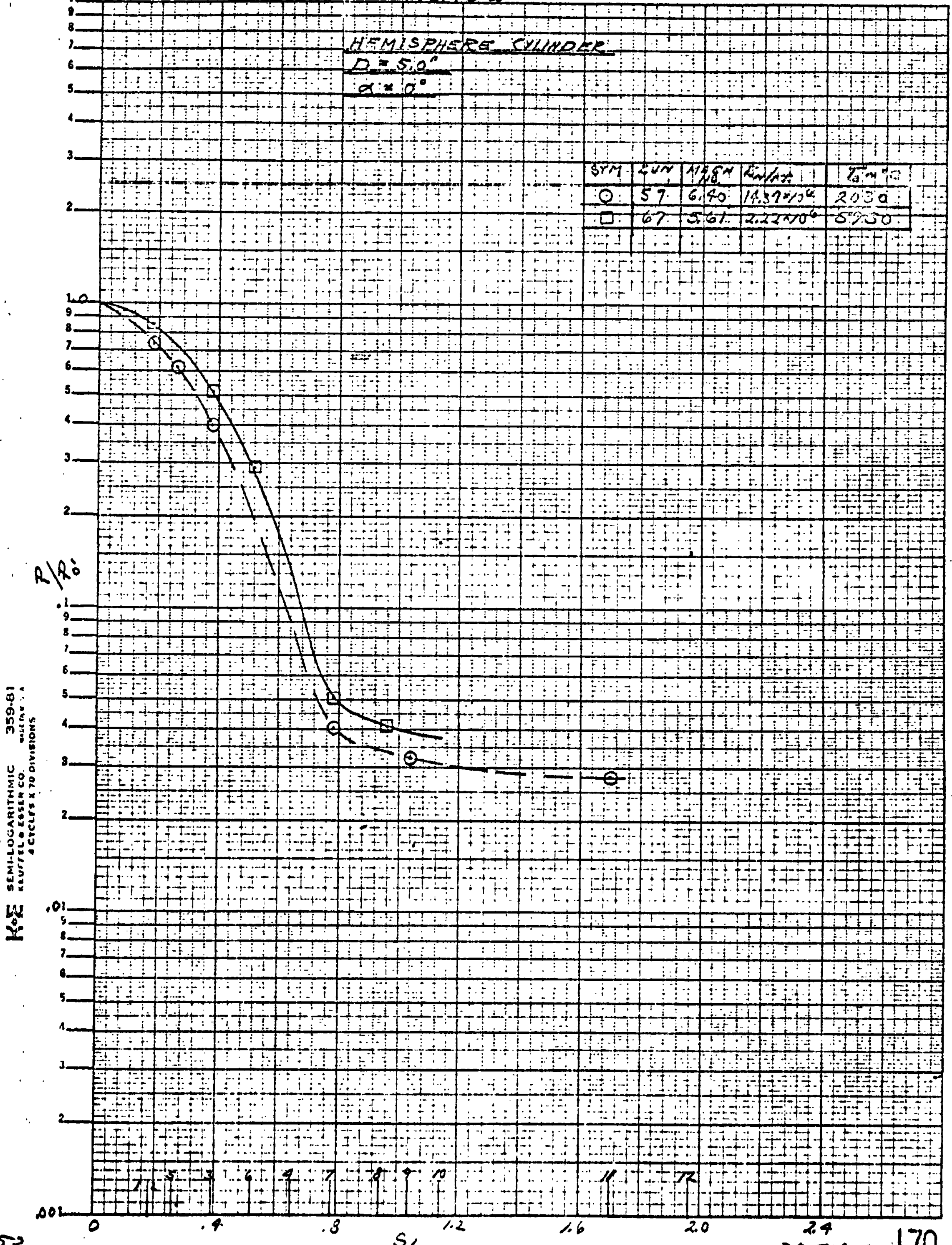

HEMISPHERE CYLINDER
D = 5.0"
α = 0°
SYM RUN MACH NO
57 6.40 2030
67 5.61 5930
R/R0
S/D
0 .4 .8 1.2 1.6 2.0 2.4
1.0
.1
.01
.001

FIG. 13b

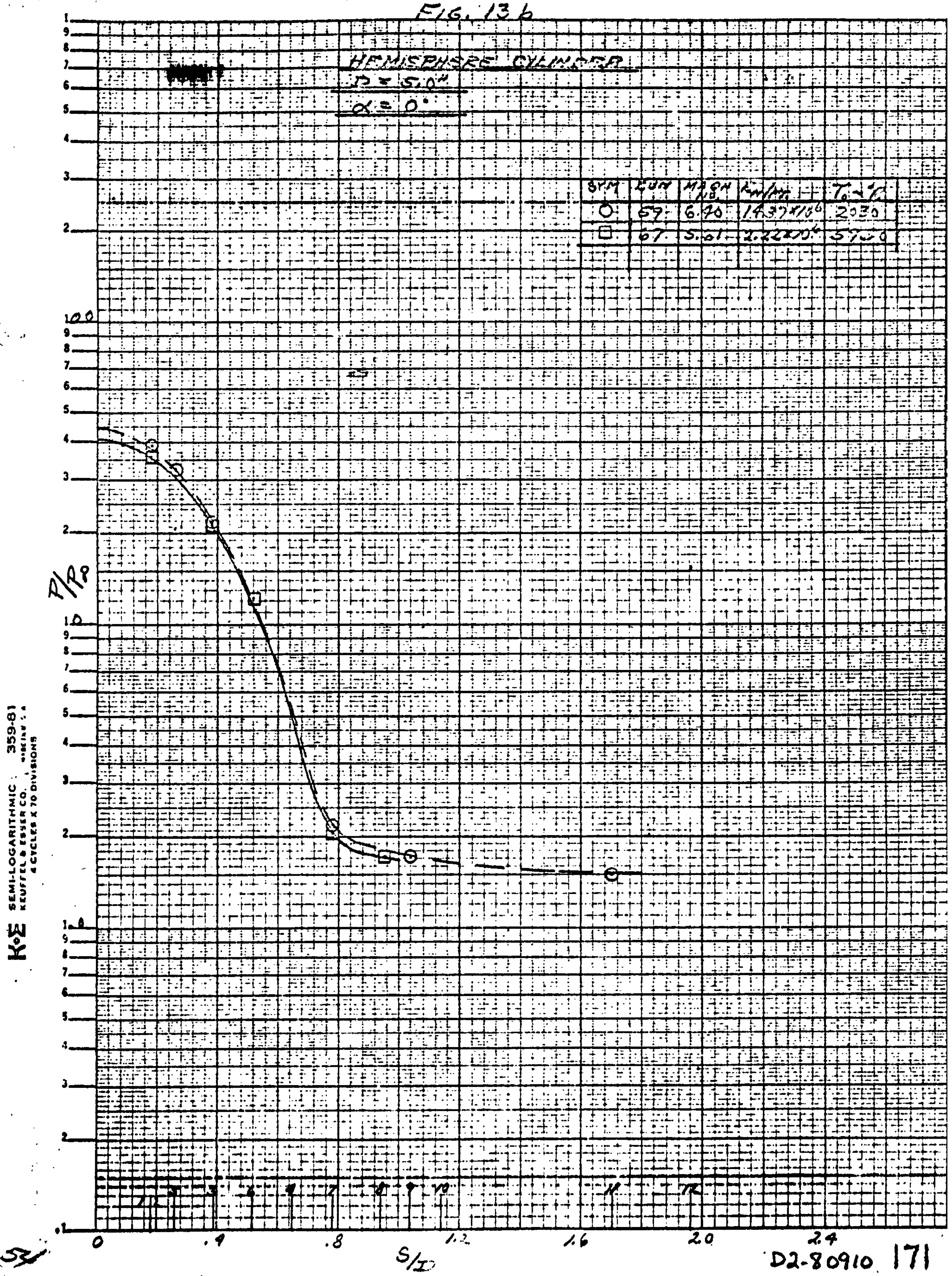

HEMISPHERE CYLINDER
D = 5.0"
α = 0°
SYM | RUN | MACH NO. | Re/ft | T_0 °R
○ | 67 | 6.70 | 1.437×10^6 | 2030
□ | 67 | 5.01 | 2.22×10^6 | 5700
P/P0
S/D
0
.4
.8
1.2
1.6
2.0
2.4
1
2
3
4
5
6
7
8
9
10
11
12
KE SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 13c

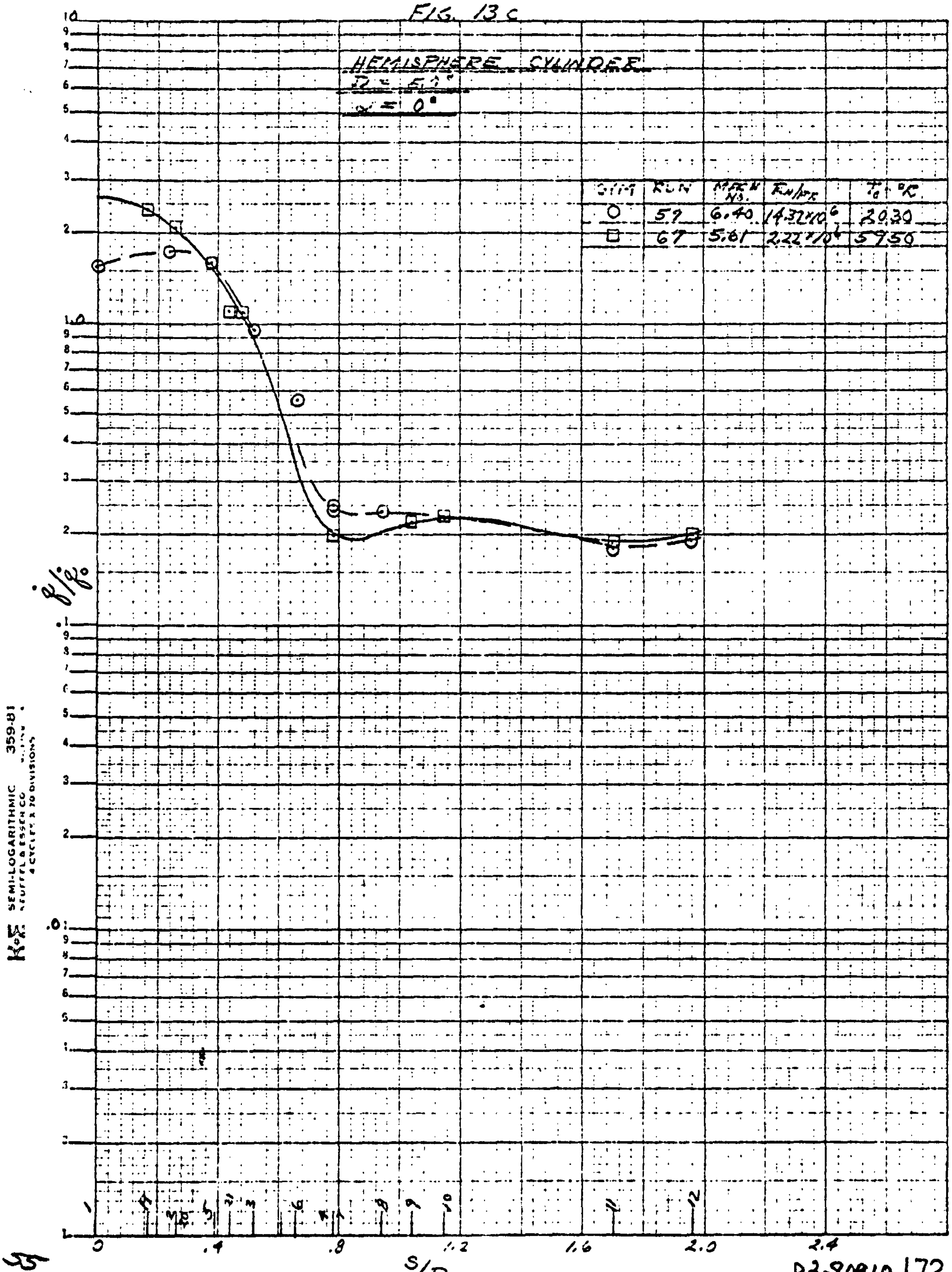
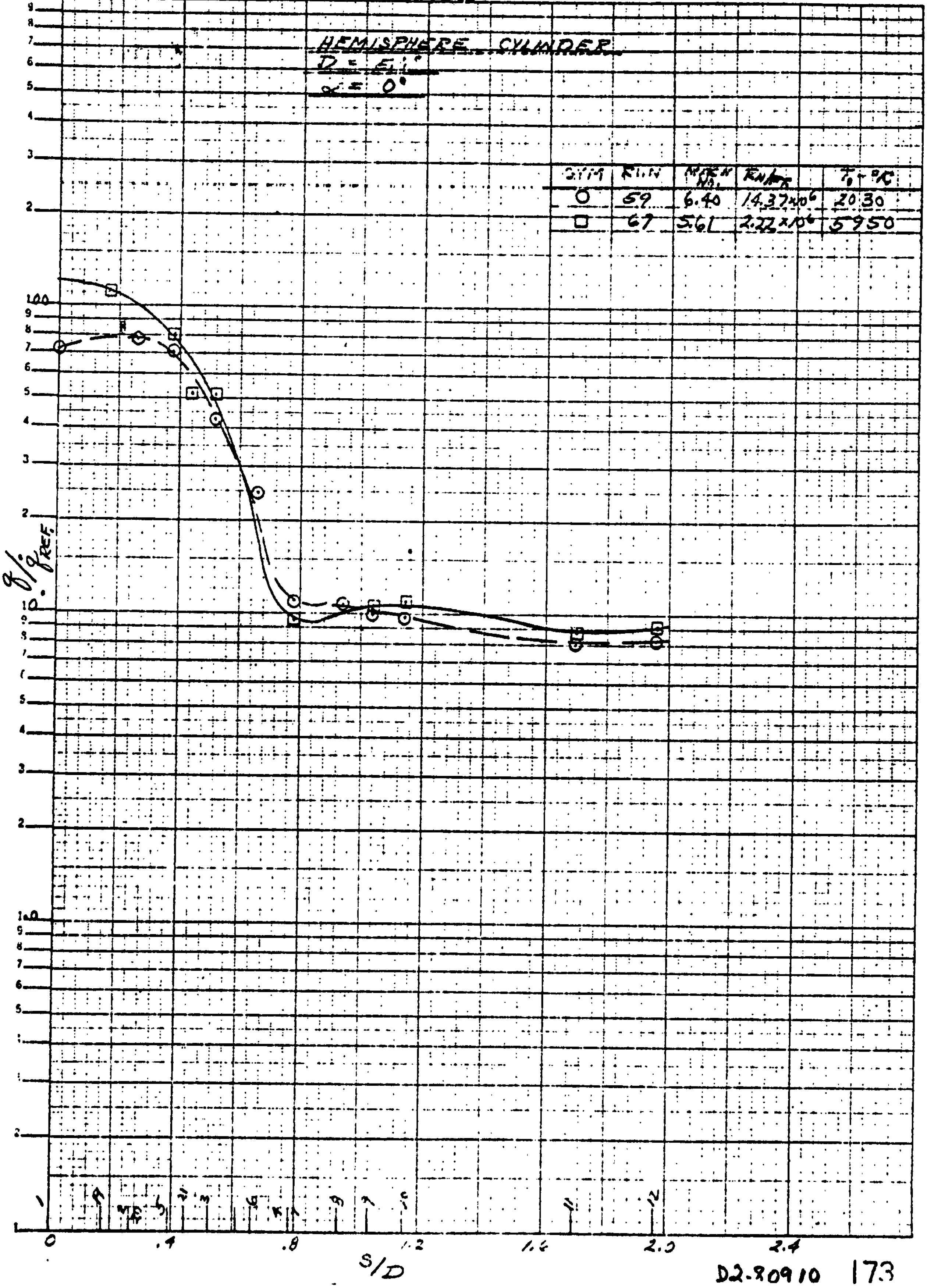

HEMISPHERE CYLINDER
α = 0°
SYM RUN MACH NO. R_N/ft T_0 °R
○ 57 6.40 14.32×10⁶ 2030
□ 67 5.61 2.22×10⁶ 5750
$\dot{q}/\dot{q}_0$
S/D
SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 13d



HEMISPHERE CYLINDER
α = 0°
SYM RUN MACH No. RN/FT T0-°R
○ 59 6.40 14.37×10^6 2030
□ 67 5.61 2.22×10^6 5950
q̇/q̇REF.
S/D
0 .4 .8 1.2 1.6 2.0 2.4
1000 100 10 1.0

EFFECT OF VARIATIONS IN TEST CONDITIONS ON THE

PRESSURE AND HEAT TRANSFER DISTRIBUTIONS OVER A HEMISPHERE CYLINDER

AT $\alpha = 20^{\circ}$

$M = 5.6 \rightarrow 6.4$

$R_N/ft. = 2.2 \times 10^6 \rightarrow 14 \times 10^6$

FIGURE 14

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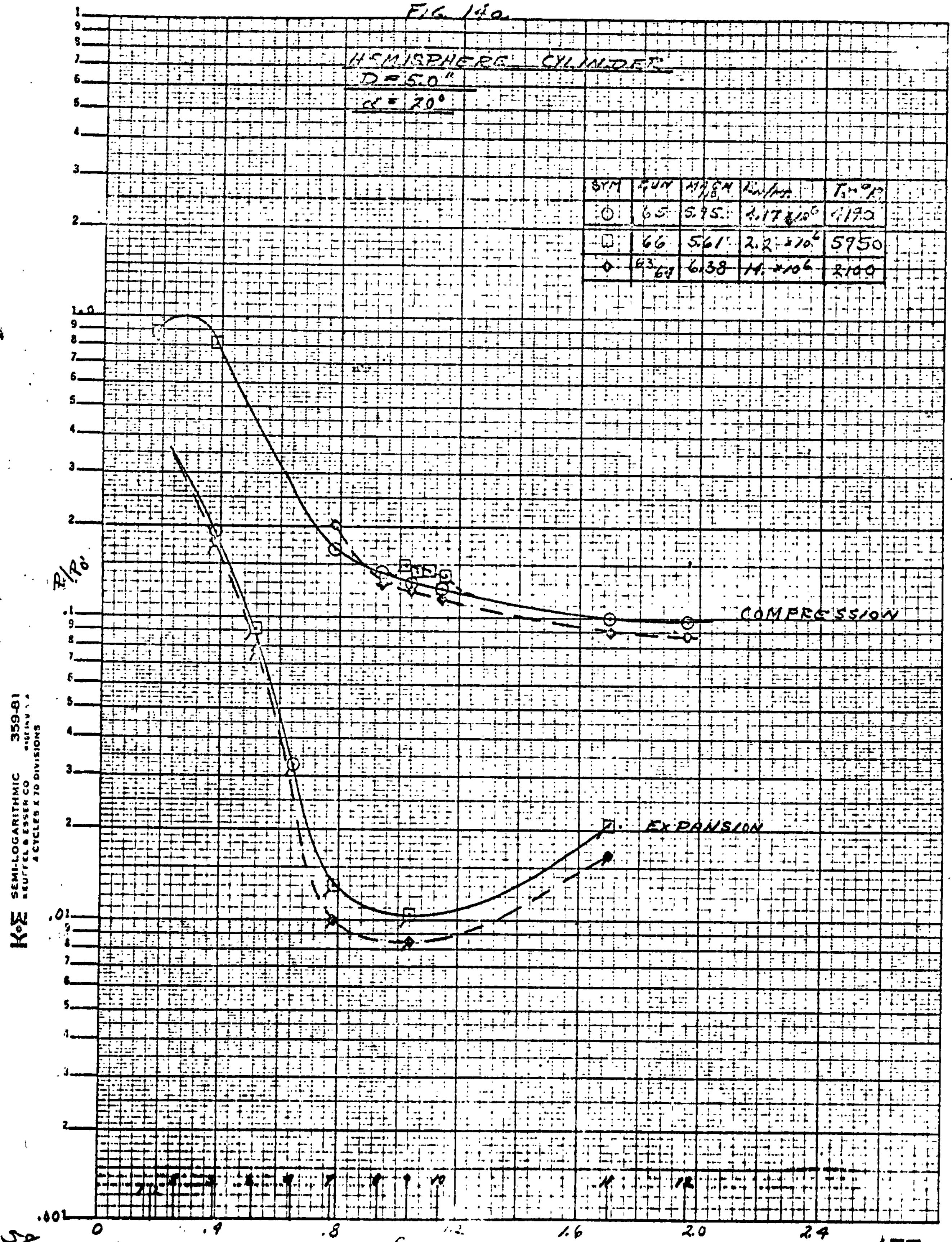


FIG. 140
HEMISPHERE CYLINDER
D = 5.0"
α = 70°
SYM RUN MACH Re/ft T₀ °R
○ 65 5.95 4.17 x 10⁶ 4190
□ 66 5.61 2.2 x 10⁶ 5950
◇ 63 67 6.38 11. x 10⁶ 2100
COMPRESSION
EXPANSION
R/R₀
S/D
0
.4
.8
1.2
1.6
2.0
2.4
10
11
12
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

FIG. 14b

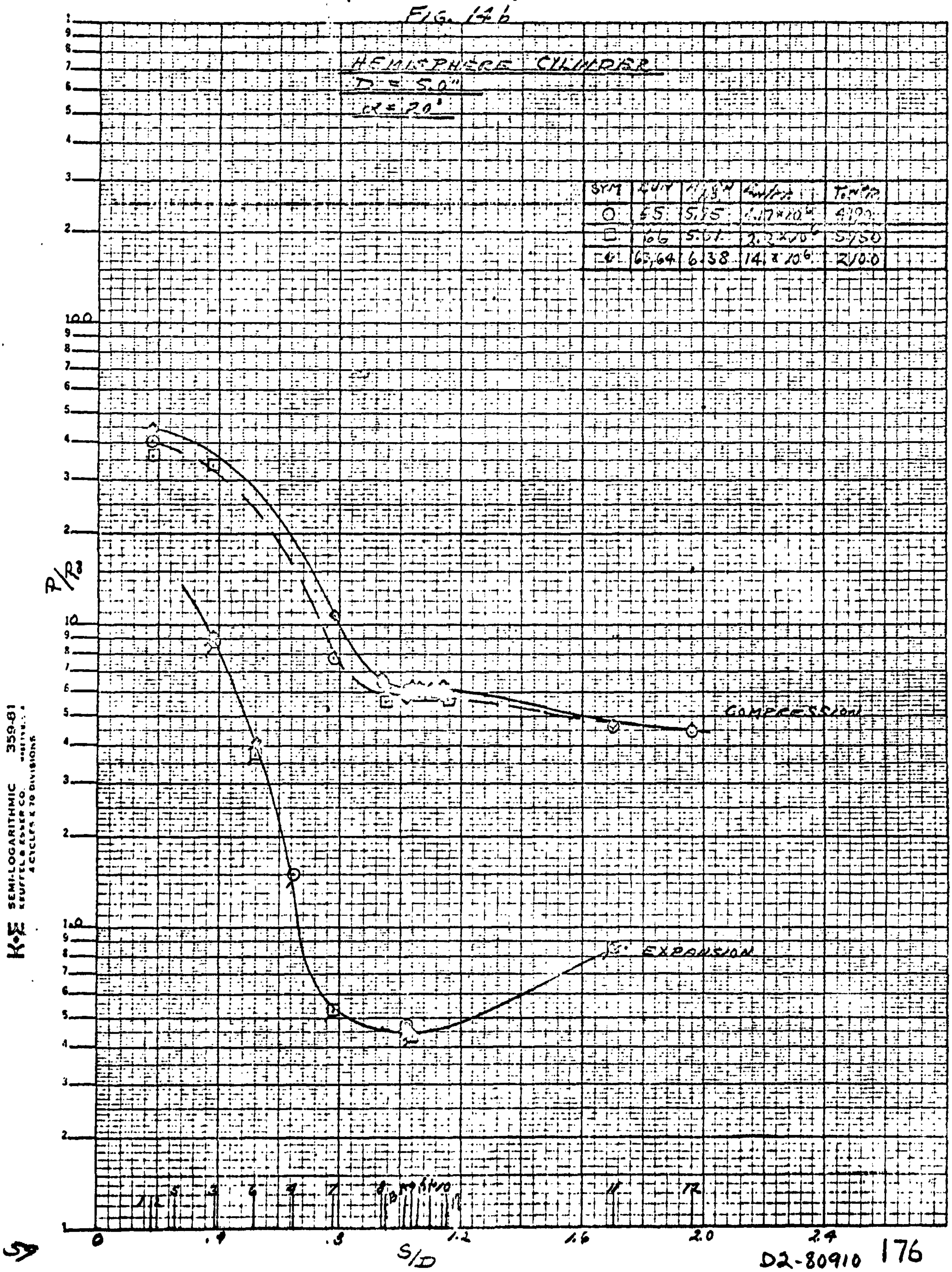
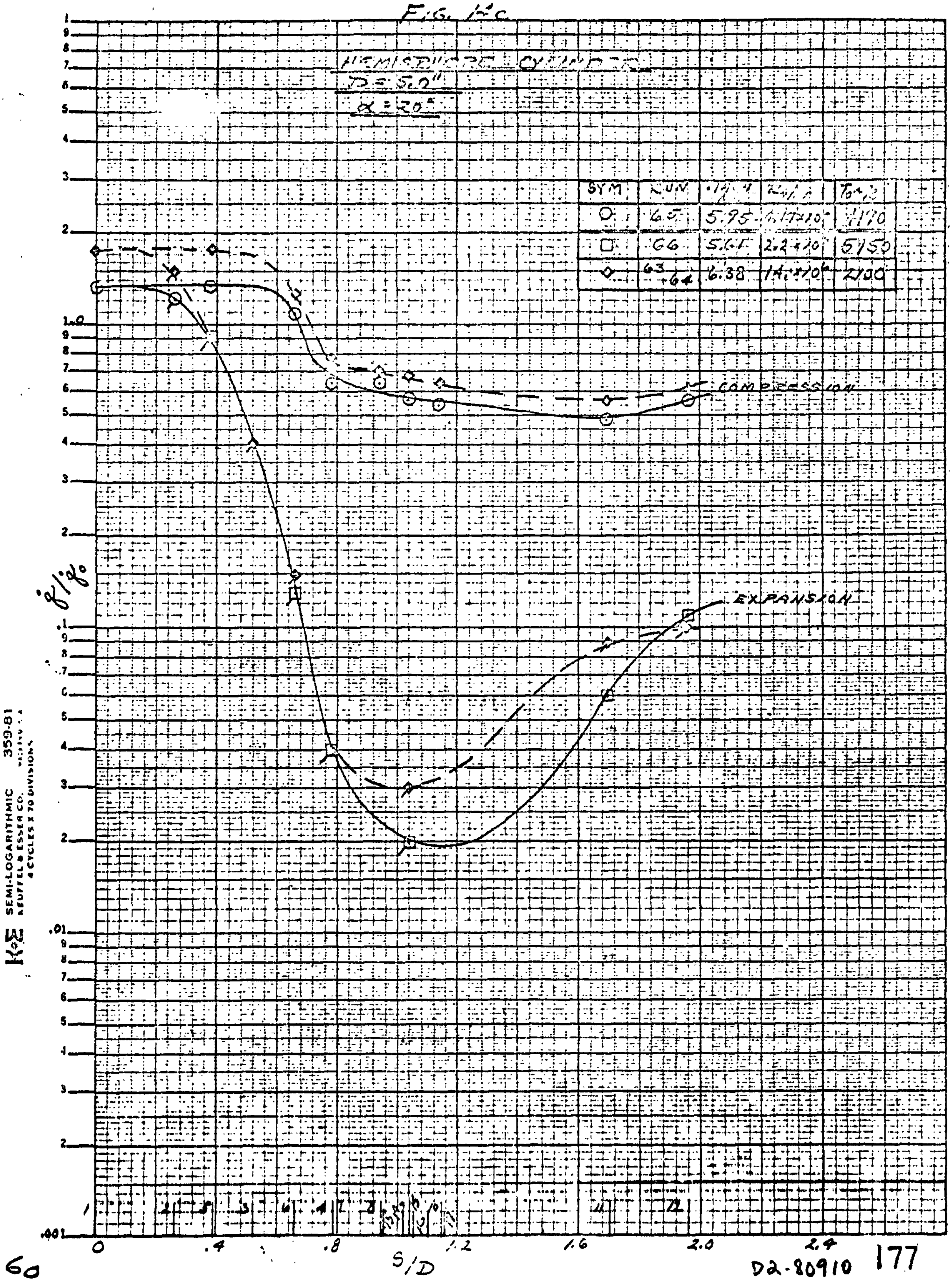
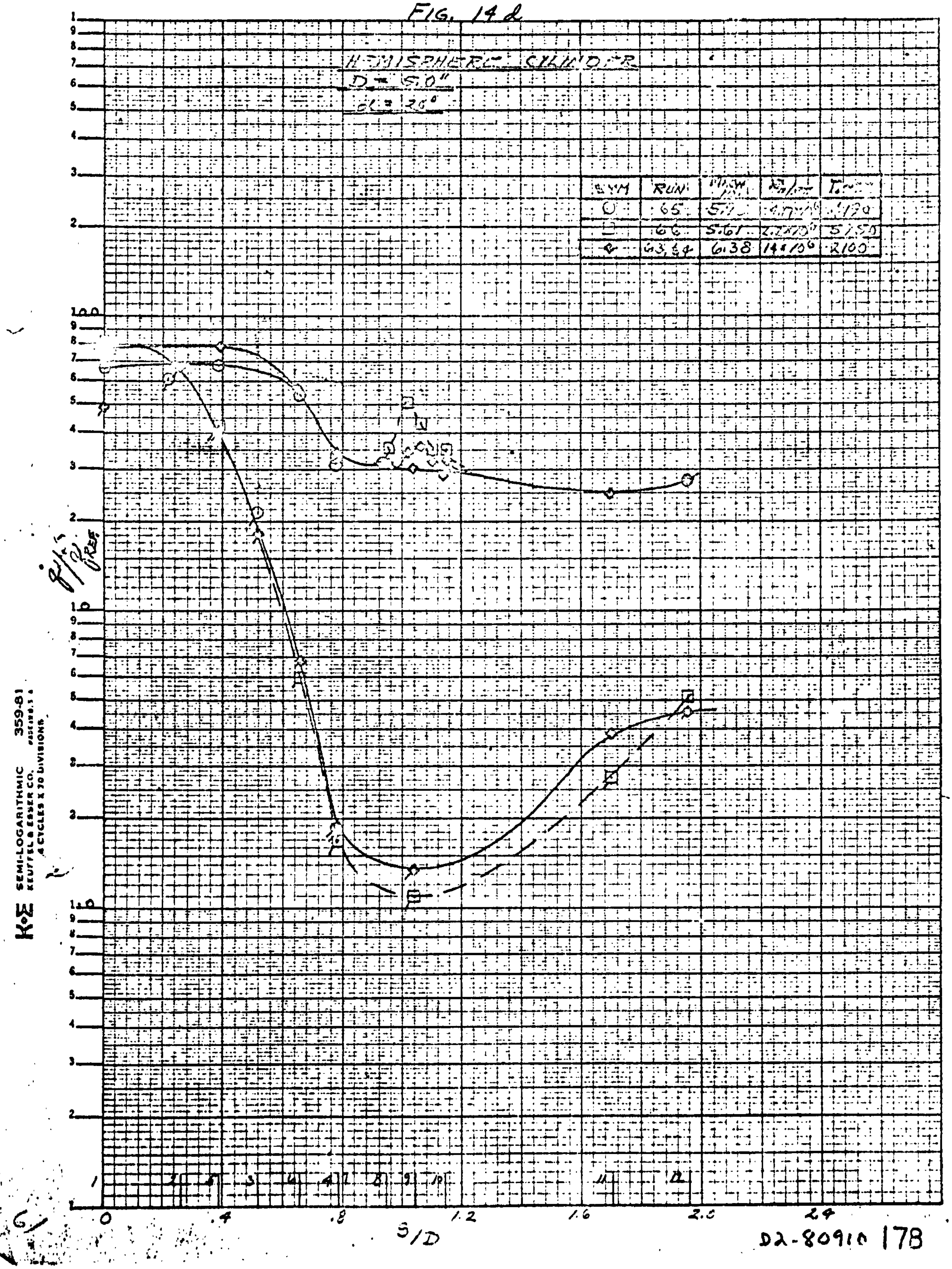

HEMISPHERE CYLINDER
D = 5.0"
α = 20°
SYM
55
5.55
4120
66
5.57
5750
65,64
6.38
14×10^6
2100
COMPRESSION
EXPANSION
P/P∞
S/D
0
.4
.8
1.2
1.6
2.0
2.4
KE SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 12c



D = 5.0"
α = 20°
SYM
RUN
65
5.95
66
5.61
2.2×10
5150
63+64
6.38
2100
COMPRESSION
EXPANSION
S/D
0
.4
.8
1.2
1.6
2.0
2.4
SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 14d


HEMISPHERIC CYLINDER
D = 5.0"
α = 20°
SYM
RUN
65
66
63, 64
5.61
6.38
2100
s/D
0
.4
.8
1.2
1.6
2.0
2.4
KEUFFEL & ESSER CO.
SEMI-LOGARITHMIC 359-81
4 CYCLES X 70 DIVISIONS

EFFECT OF VARIATIONS IN TEST CONDITIONS ON THE

PRESSURE AND HEAT TRANSFER DISTRIBUTIONS OVER A HEMISPHERE CYLINDER

AT $\alpha = 0$

$M_\infty = 13.48 \rightarrow 15.49$

$R_N/\text{ft.} = 2.7 \times 10^4 \rightarrow 2.49 \times 10^5$

FIGURE 15

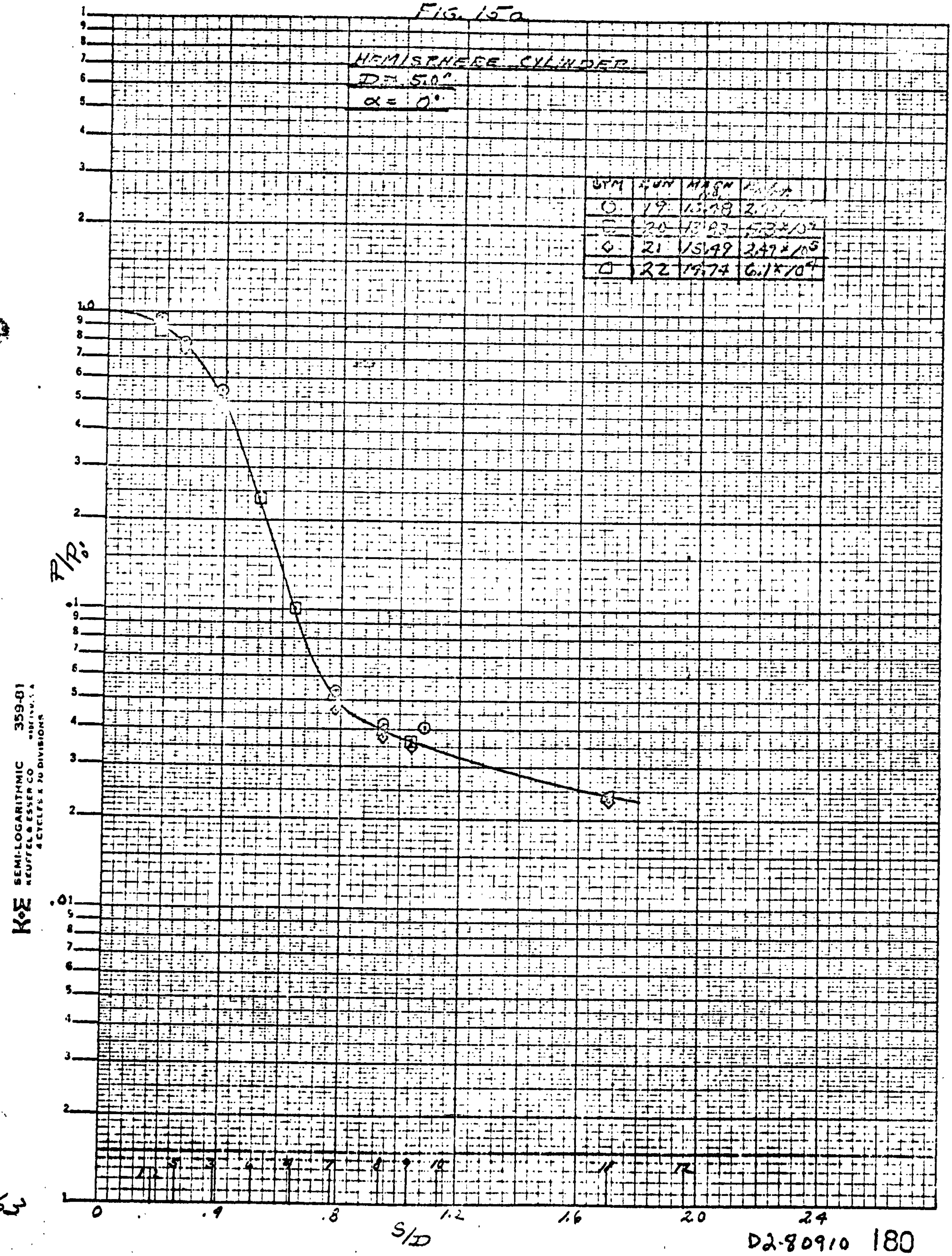


FIG. 15a
HEMISPHERE CYLINDER
D = 5.0"
α = 0°
19
21 15.49 2.49×10^5
22 15.74 6.1×10^4
P/P₀
S/D
0
.4
.8
1.2
1.6
2.0
2.4
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 156

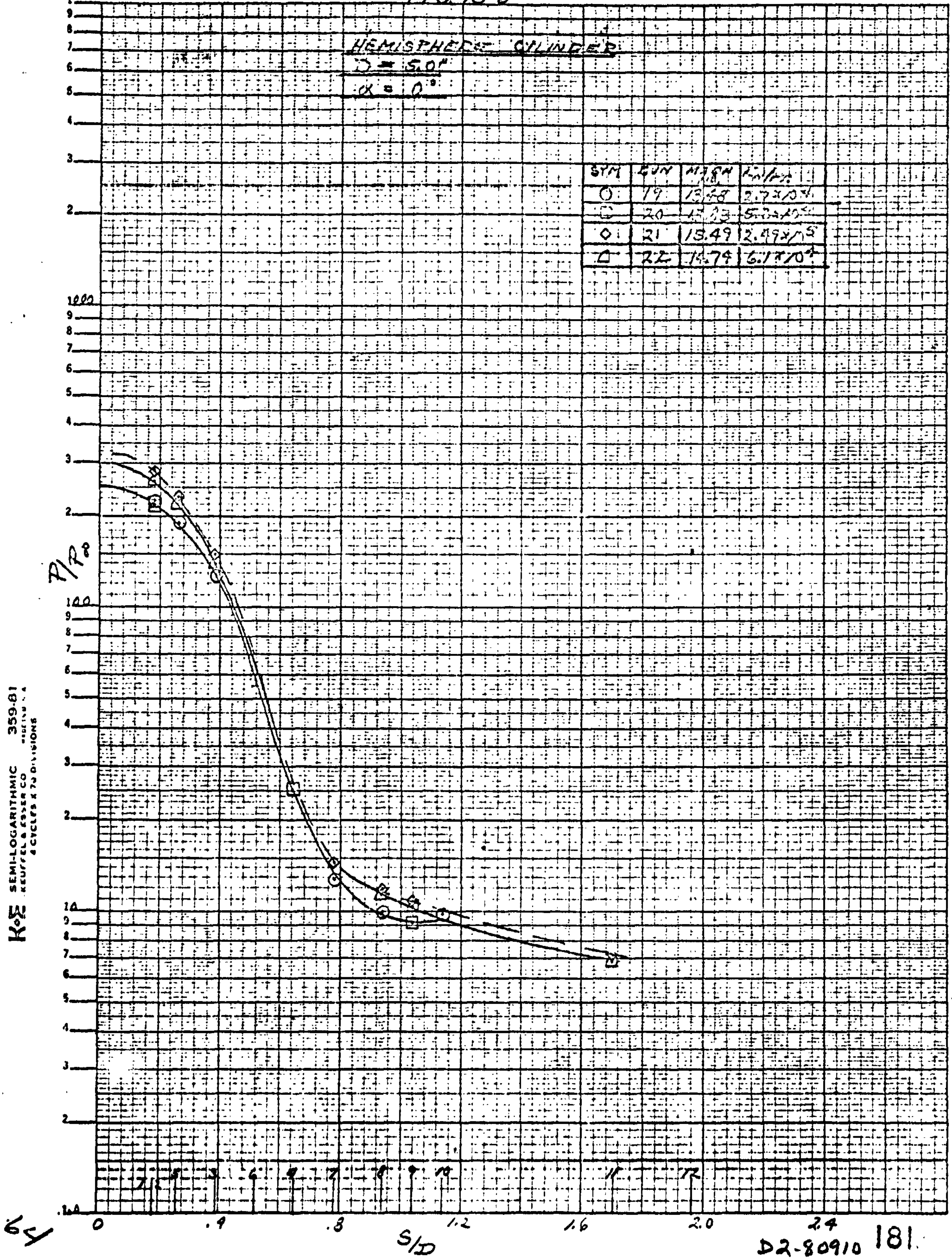

HEMISPHERE CYLINDER
D = 5.0"
α = 0°
SYM | RUN | MACH | Re/ft
○ | 19 | 13.48 | 2.7×10⁴
□ | 20 | 15.23 | 5.2×10⁵
◇ | 21 | 15.49 | 2.49×10⁵
△ | 22 | 14.74 | 6.17×10⁴
P/P∞
S/D
0
.4
.8
1.2
1.6
2.0
2.4
1000
100
10
KE SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

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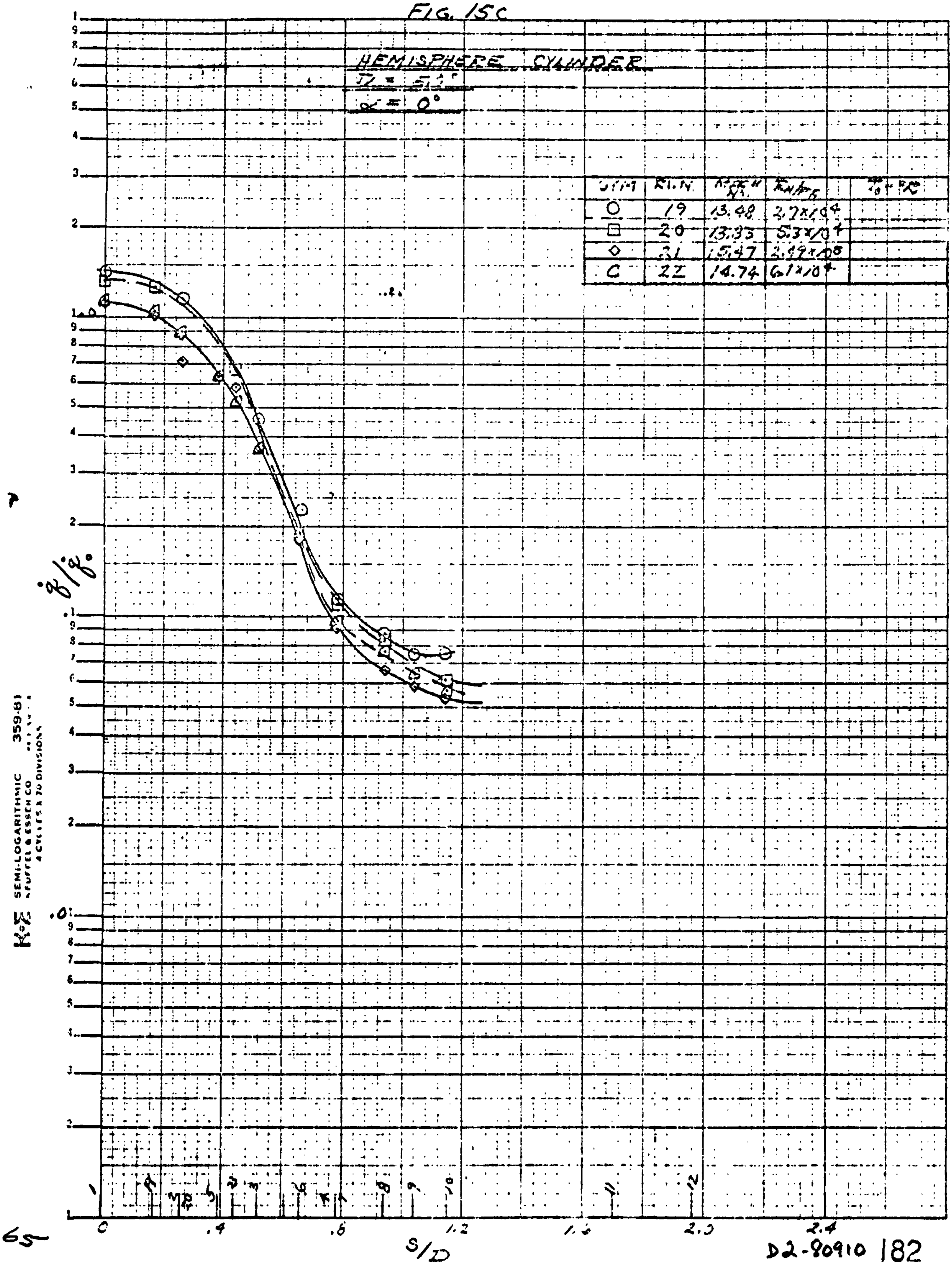
FIG. 15C


HEMISPHERE CYLINDER
α = 0°
○ 19 13.48 2.7×10⁴
□ 20 13.35 5.3×10⁴
◇ 21 15.47 2.19×10⁵
C 22 14.74 6.1×10⁴
S/D
0
.4
.8
1.2
1.6
2.0
2.4
1.0
.1
.01
SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.

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PRESSURE AND HEAT TRANSFER DISTRIBUTION ON THE COMPRESSION AND EXPANSION SIDES OF A HEMISPHERE CYLINDER

AT $\alpha = 10^{\circ}$

$M = 6.38$

$R_N/ft. = 1.36 \times 10^6$

FIGURE 16

FIG. 16a

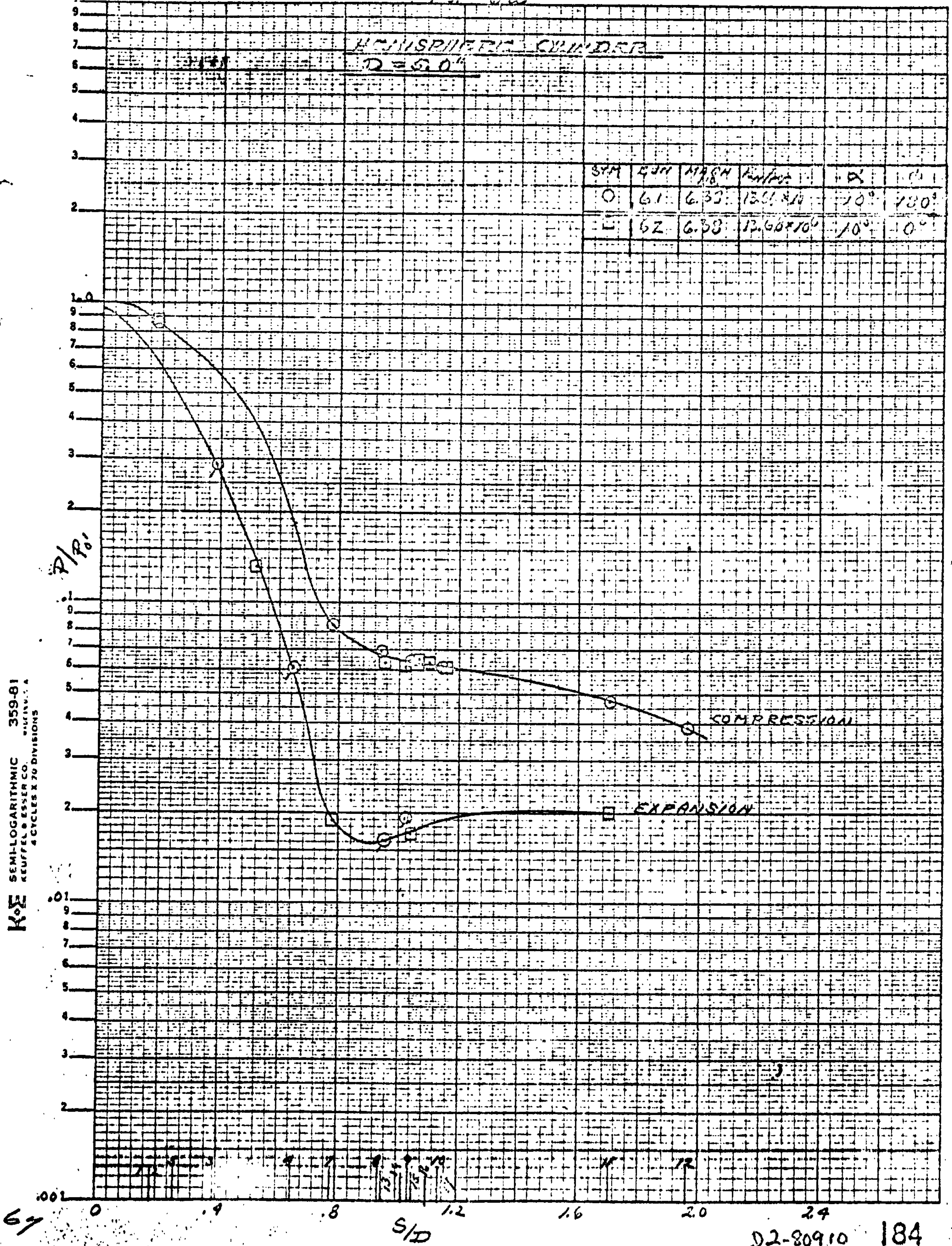

HEMISPHERIC CYLINDER
D = 5.0"
SYM | RUN | MACH | R/ft | α | φ
○ | 61 | 6.33 | 12.60×10⁶ | 10° | 180°
□ | 62 | 6.38 | 12.60×10⁶ | 10° | 10°
COMPRESSION
EXPANSION
P/P₀'
S/D
0
.4
.8
1.2
1.6
2.0
2.4
KE SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 16 b

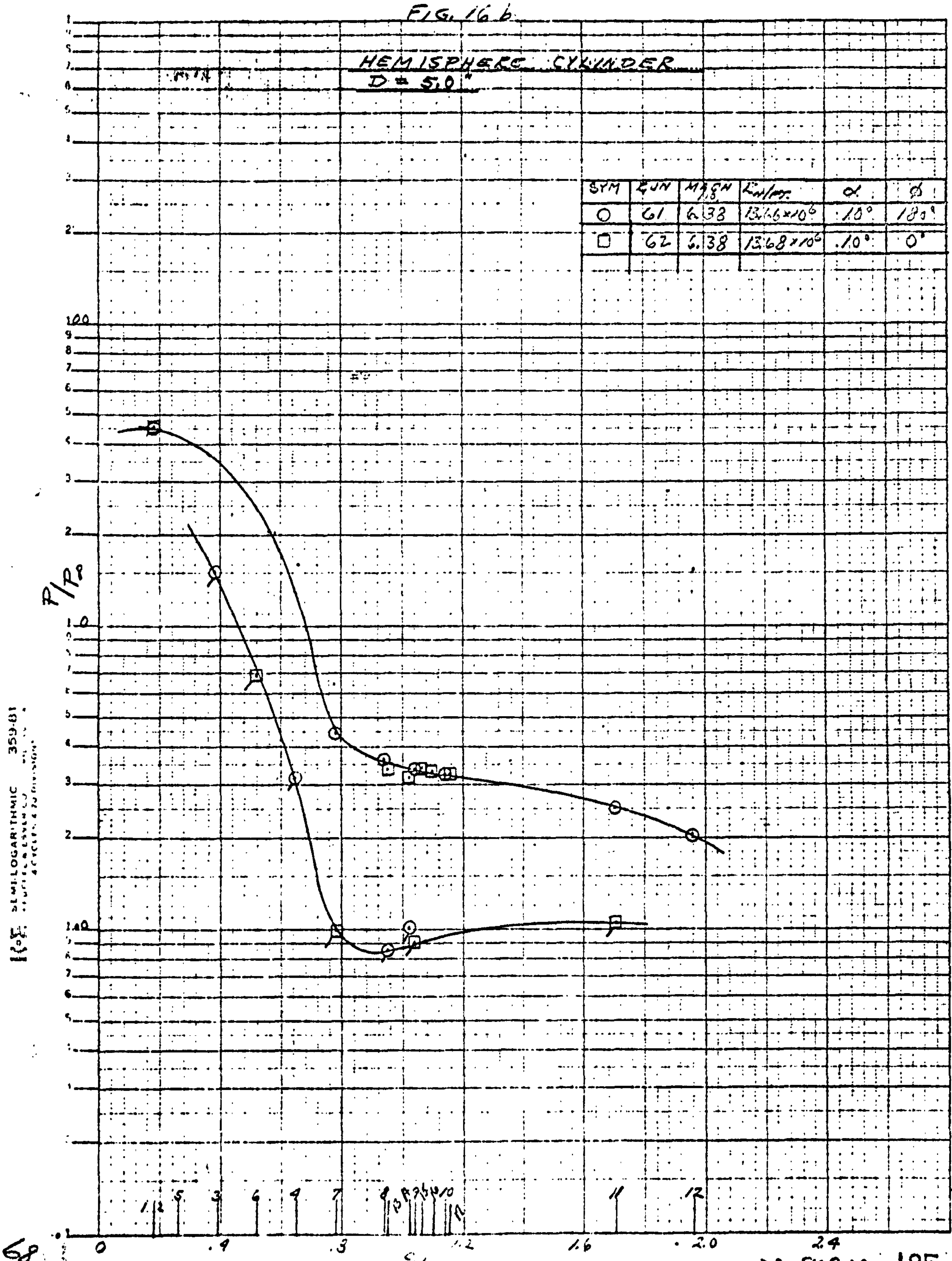
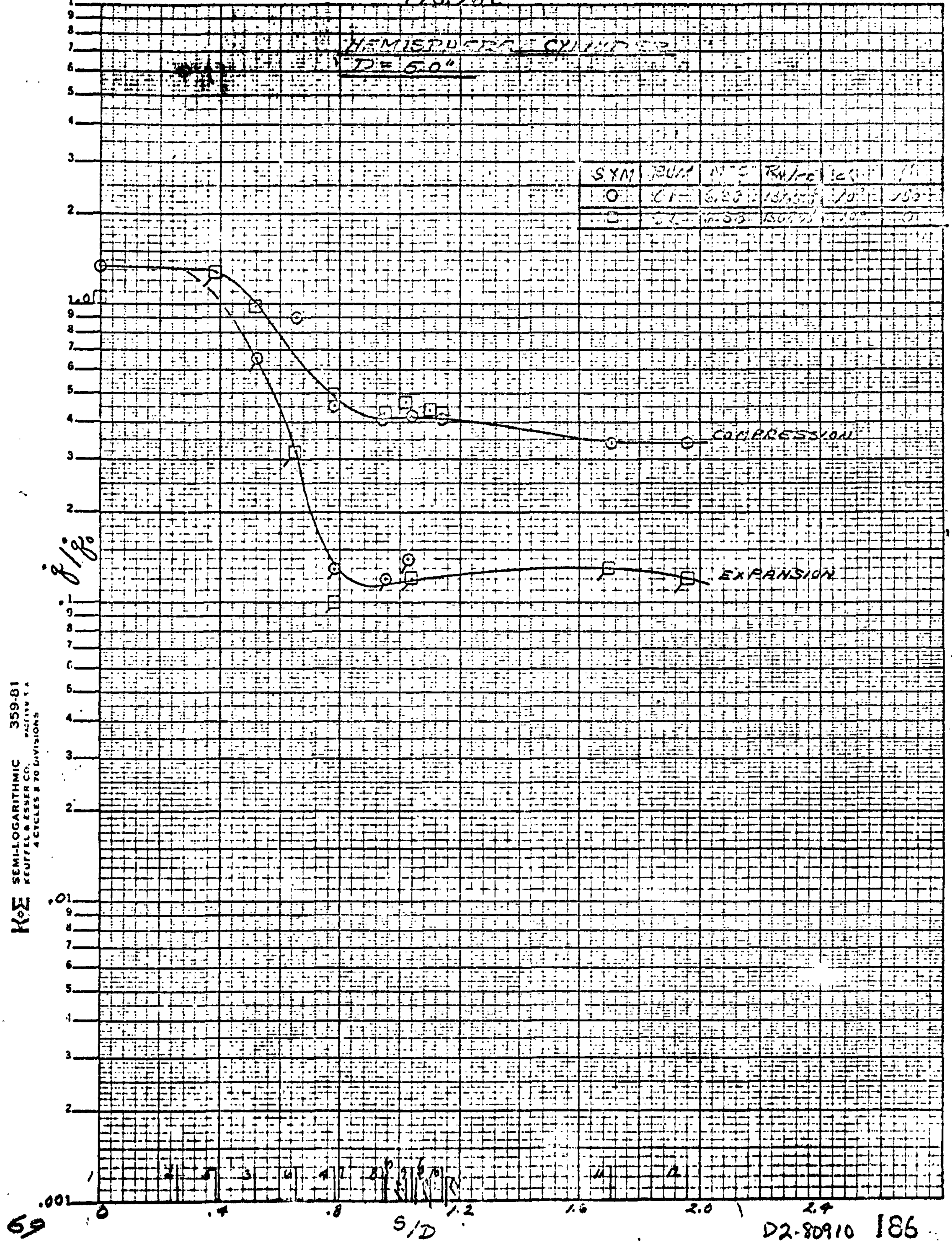

HEMISPHERE CYLINDER
D = 5.0"
SYM | RUN | MACH | R_N/FT. | α | φ
○ | 61 | 6.38 | 13.66×10^6 | .10° | 180°
□ | 62 | 6.38 | 13.68×10^6 | .10° | 0°
P/P8
100
1.0
S/D
0
.4
.8
1.2
1.6
2.0
2.4
1 2 5 3 6 4 7 8 13 9 10 11 12
K&E SEMI-LOGARITHMIC 359-81

FIG. 16c


HEMISPHERICAL CYLINDER
D = 5.0"
SYM
COMPRESSION
EXPANSION
S/D
SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

PRESSURE AND HEAT TRANSFER DISTRIBUTION ON THE COMPRESSION AND EXPANSION SIDES OF A HEMISPHERE CYLINDER

AT $\alpha = 20^{\circ}$

$M_{\infty} = 6.38$

$R_N/ft. = 14 \times 10^{6}$

FIGURE 17

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FIG. 17a

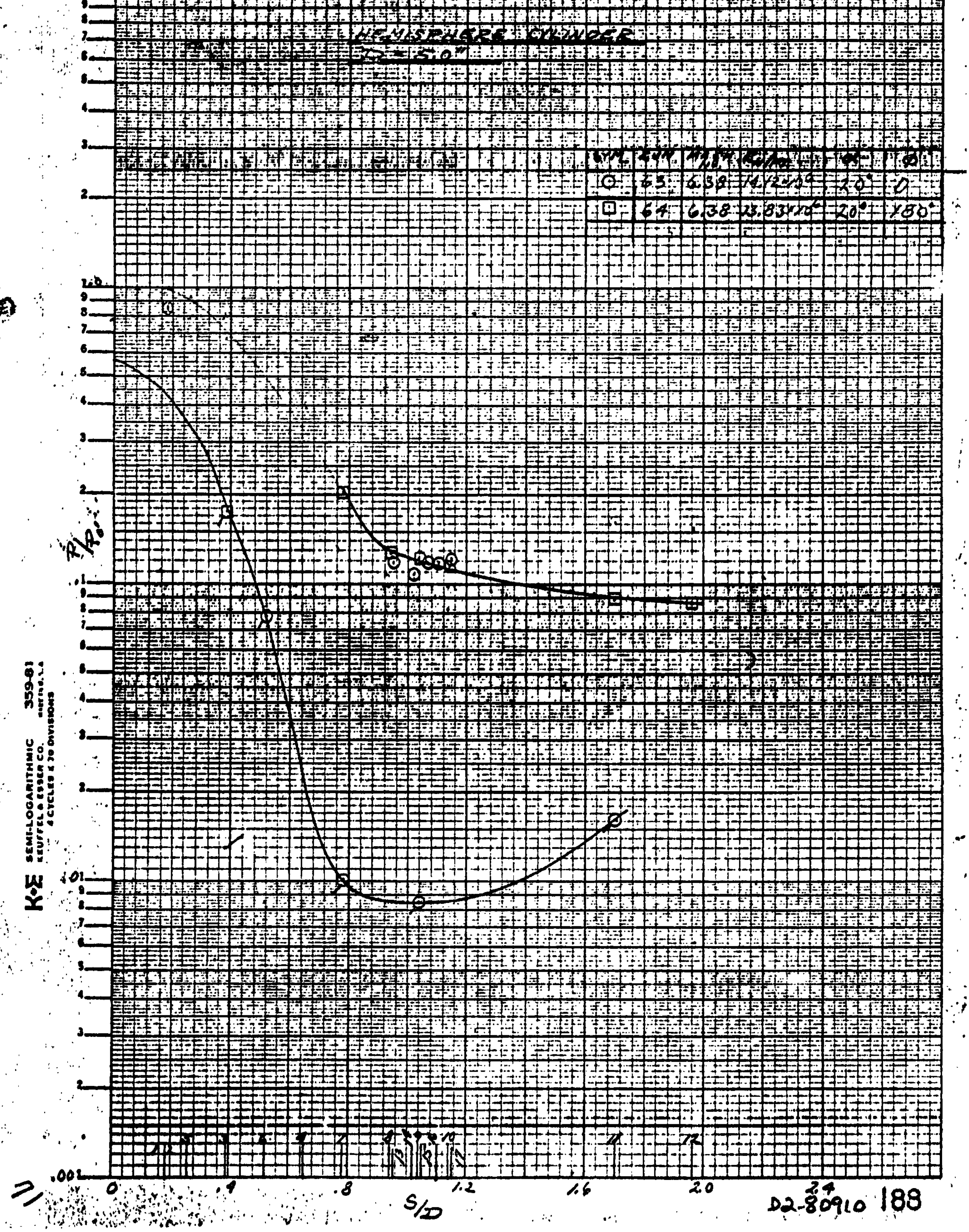

HEMISPHERE CYLINDER
D = 5.0"
63 6.38 14.2x10^6 20° 0
64 6.38 23.83x10^6 20° 180°
R/R0
S/D
0 .4 .8 1.2 1.6 2.0 2.4
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 176

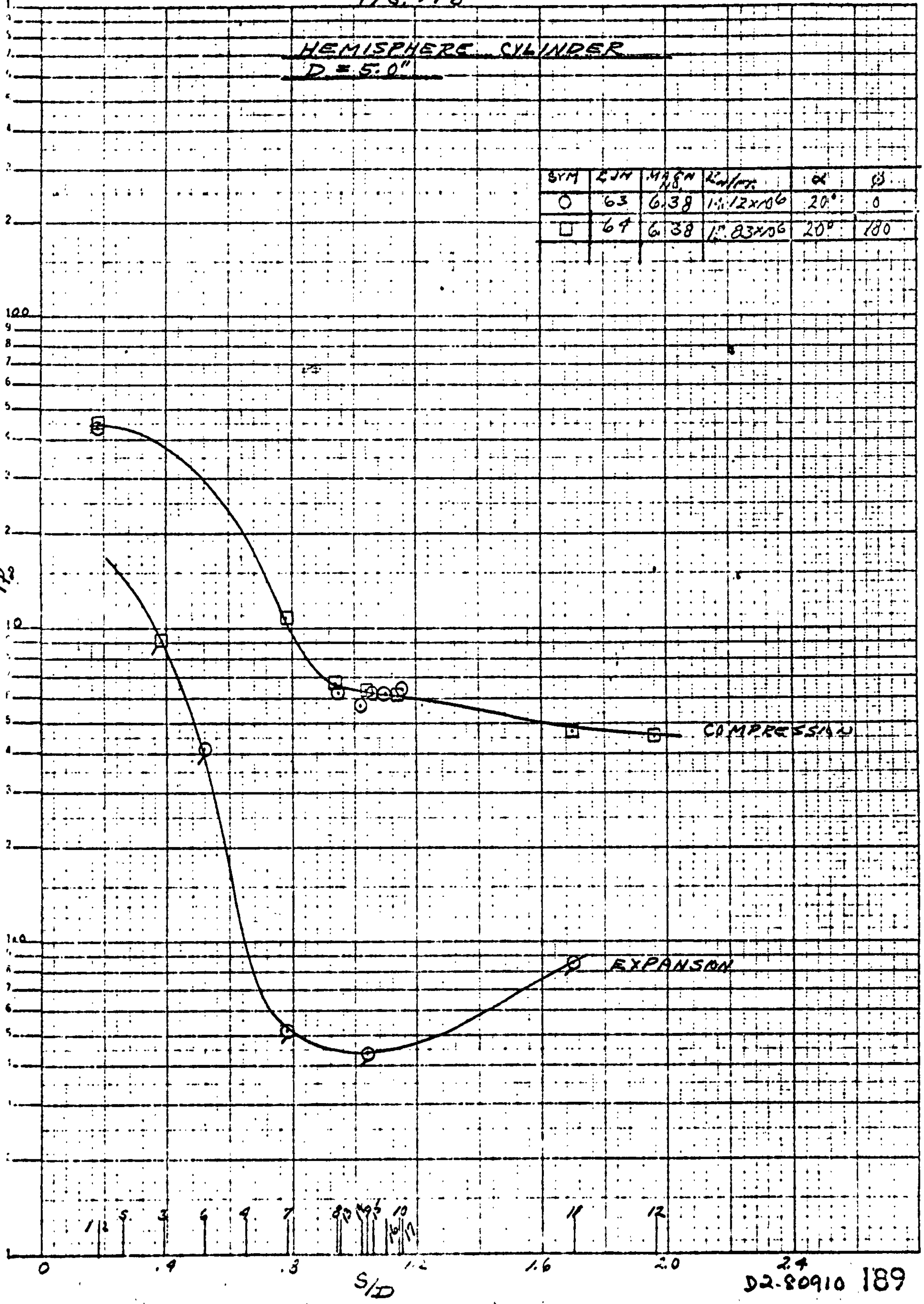
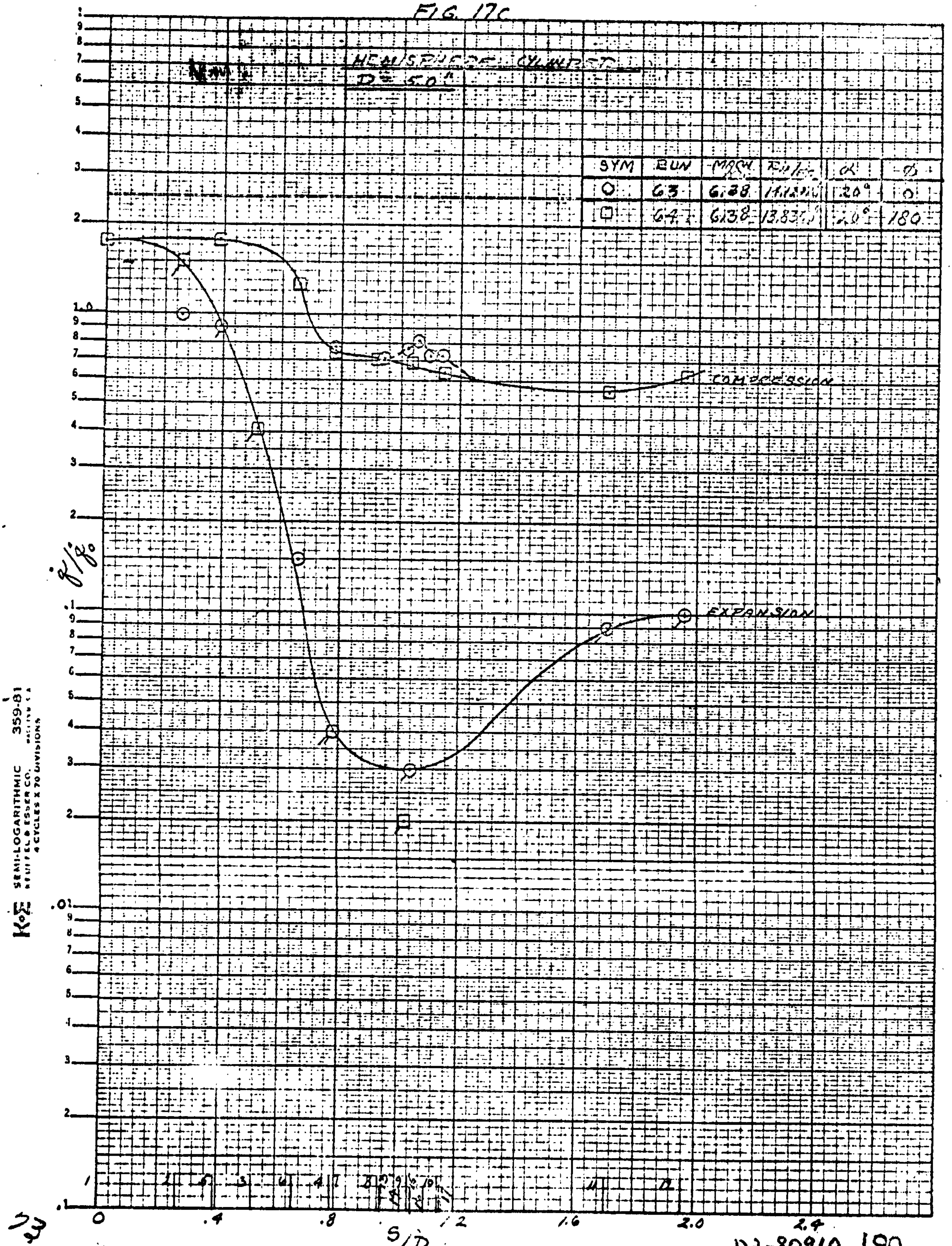

HEMISPHERE CYLINDER
D = 5.0"
SYM | RUN | MACH NO. | R/FT. | α | φ
○ | 63 | 6.38 | 1.12×10^6 | 20° | 0
□ | 64 | 6.38 | 1.83×10^6 | 20° | 180
P/P∞
COMPRESSION
EXPANSION
S/D
0
.4
.8
1.2
1.6
2.0
2.4
100
10
1.0
1
1
2
5
3
6
4
7
8
9
10
11
12

FIG. 17C


HEMISPHERE - CYLINDER
D = 5.0"
SYM | RUN | MACH | Re/ft | α | φ
○ | 63 | 6.38 | 20° | 0
□ | 64 | 6.38 | 20° | 180
COMPRESSION
EXPANSION
$\dot{q}/\dot{q}_0$
S/D
0
.4
.8
1.2
1.6
2.0
2.4
K&E SEMI-LOGARITHMIC 359-81
4 CYCLES X 70 DIVISIONS

PRESSURE AND HEAT TRANSFER VARIATIONS

AROUND A HEMISPHERE CYLINDER

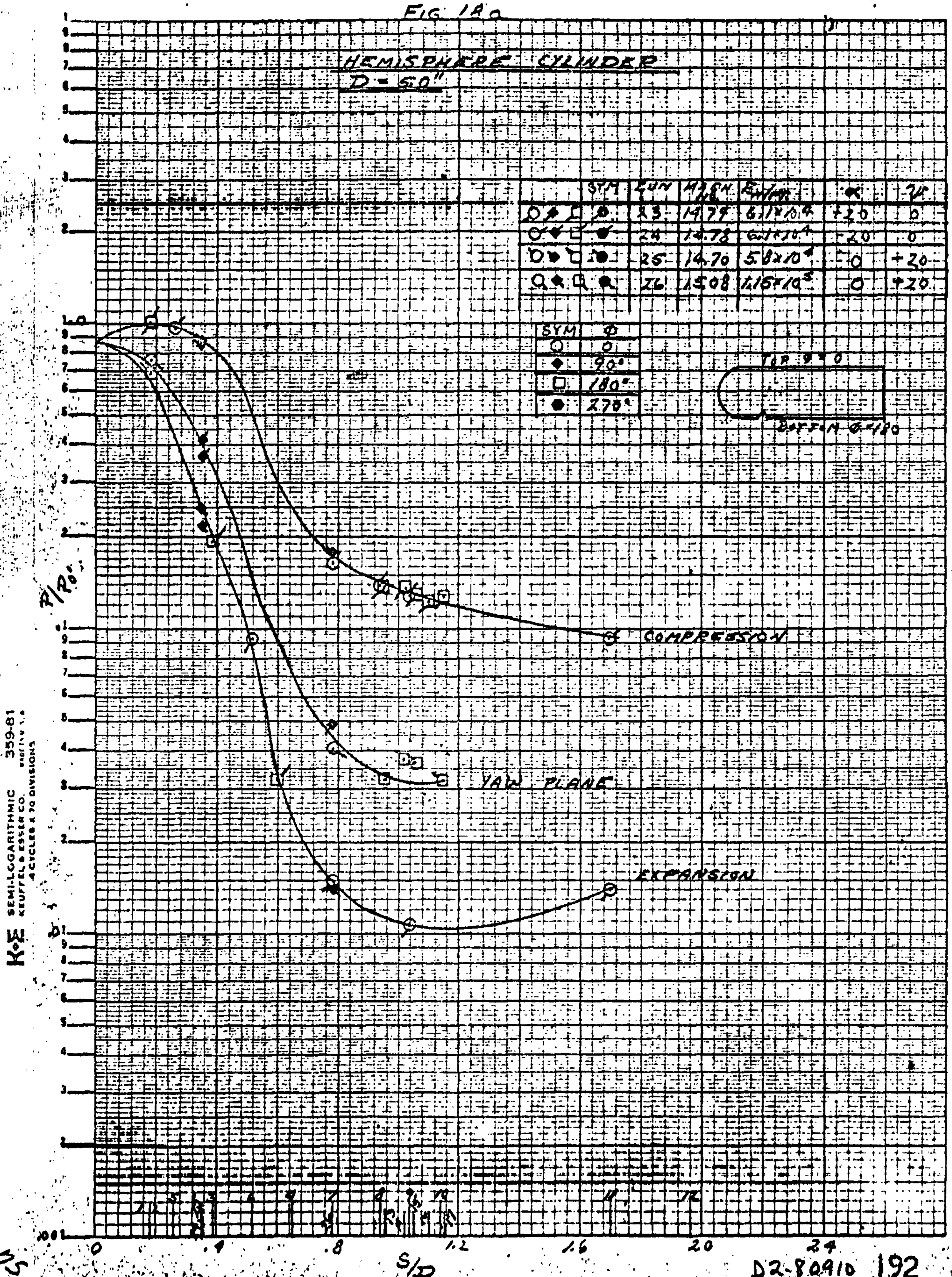
AT $\alpha = 20°$

$M \approx 14.8$

$R_N/ft. \approx 6 \times 10^4$

FIGURE 18

FIG. 18a


HEMISPHERE CYLINDER
D = 5.0"
SYM RUN MACH
23 14.79 6.1×10^4 +20 0
24 14.78 -20 0
25 14.70 5.82×10^4 0 +20
26 15.08 1.15×10^5 0 +20
SYM Φ
0
90°
180°
270°
TOP Φ = 0
BOTTOM Φ = 180
COMPRESSION
YAW PLANE
EXPANSION
P/P₀'
S/D
0
.4
.8
1.2
1.6
2.0
2.4
SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

205

FIG 18b.

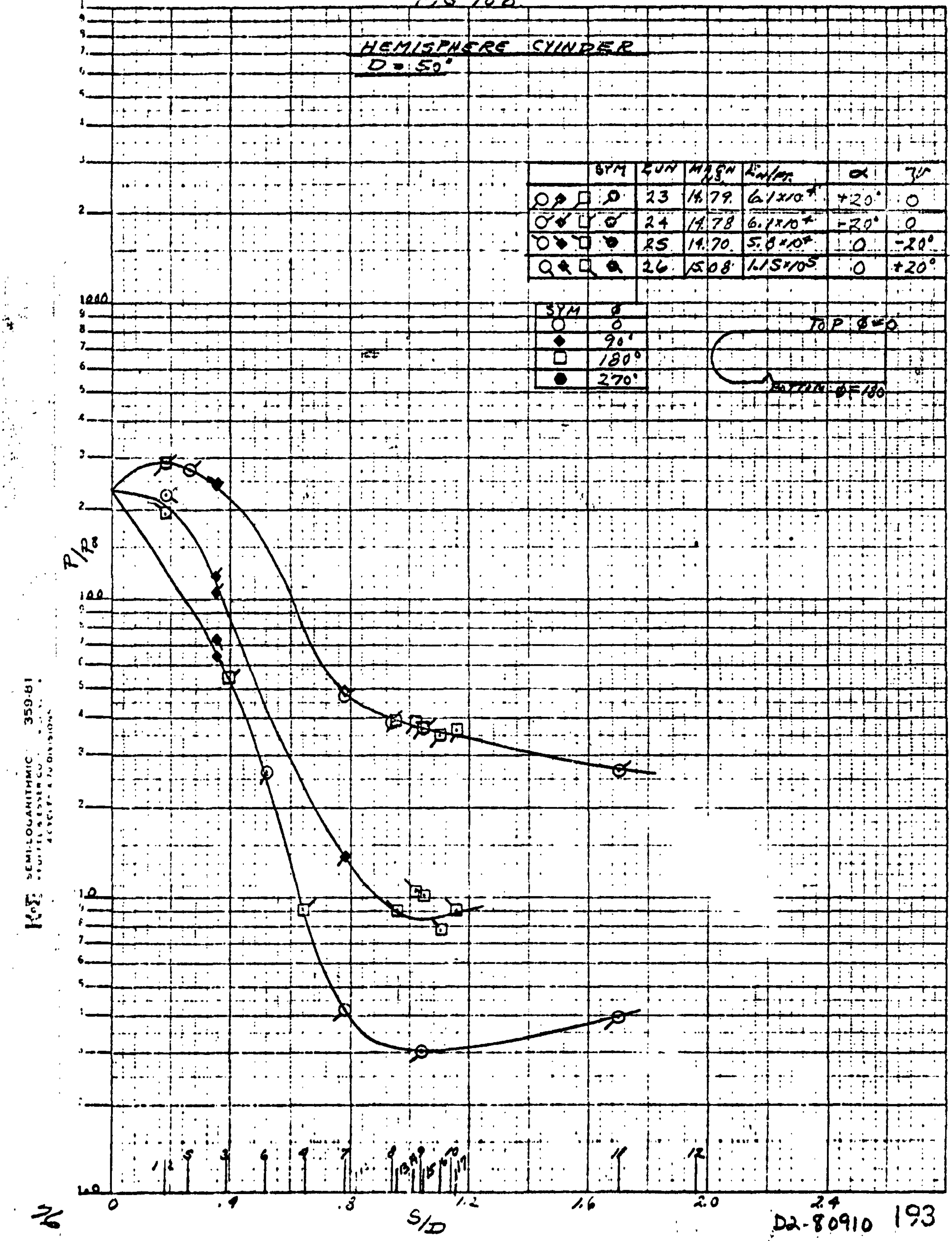
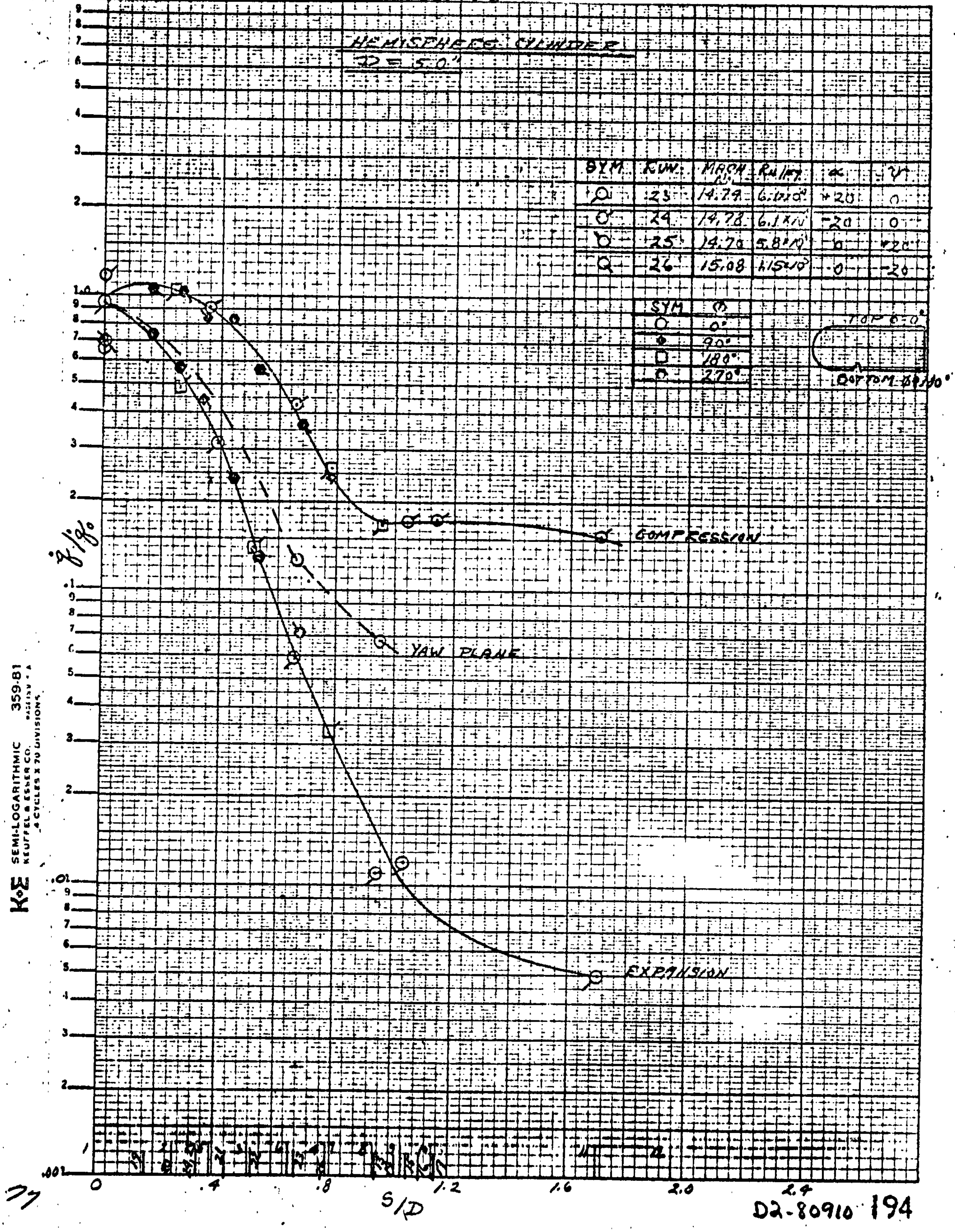

HEMISPHERE CYLINDER
D = 50°
SYM | RUN | MACH | R/FT. | α | ψ
23 | 14.79 | 6.1×10⁴ | +20° | 0
24 | 14.78 | 6.1×10⁴ | -20° | 0
25 | 14.70 | 5.8×10⁴ | 0 | -20°
26 | 15.08 | 1.15×10⁵ | 0 | +20°
SYM | φ
0
90°
180°
270°
TOP φ=0
BOTTOM φ=180
R/R8
S/D
0
.4
.8
1.2
1.6
2.0
2.4
SEMI-LOGARITHMIC 359-81

FIG. 18C


HEMISPHERE CYLINDER
D = 5.0"
SYM RUN MACH RN/FT α ψ
23 14.79 6.1x10^6 +20 0
24 14.78 6.1x10^6 -20 0
25 14.70 5.8x10^6 0 +20
26 15.08 6.15x10^6 0 -20
SYM φ
0°
90°
180°
270°
TOP φ=0°
BOTTOM φ=180°
COMPRESSION
YAW PLANE
EXPANSION
q/q0
S/D
0
.4
.8
1.2
1.6
2.0
2.4
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

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PRESSURE AND HEAT TRANSFER DISTRIBUTION ON THE

COMPRESSION AND EXPANSION SIDES OF A HEMISPHERE CYLINDER

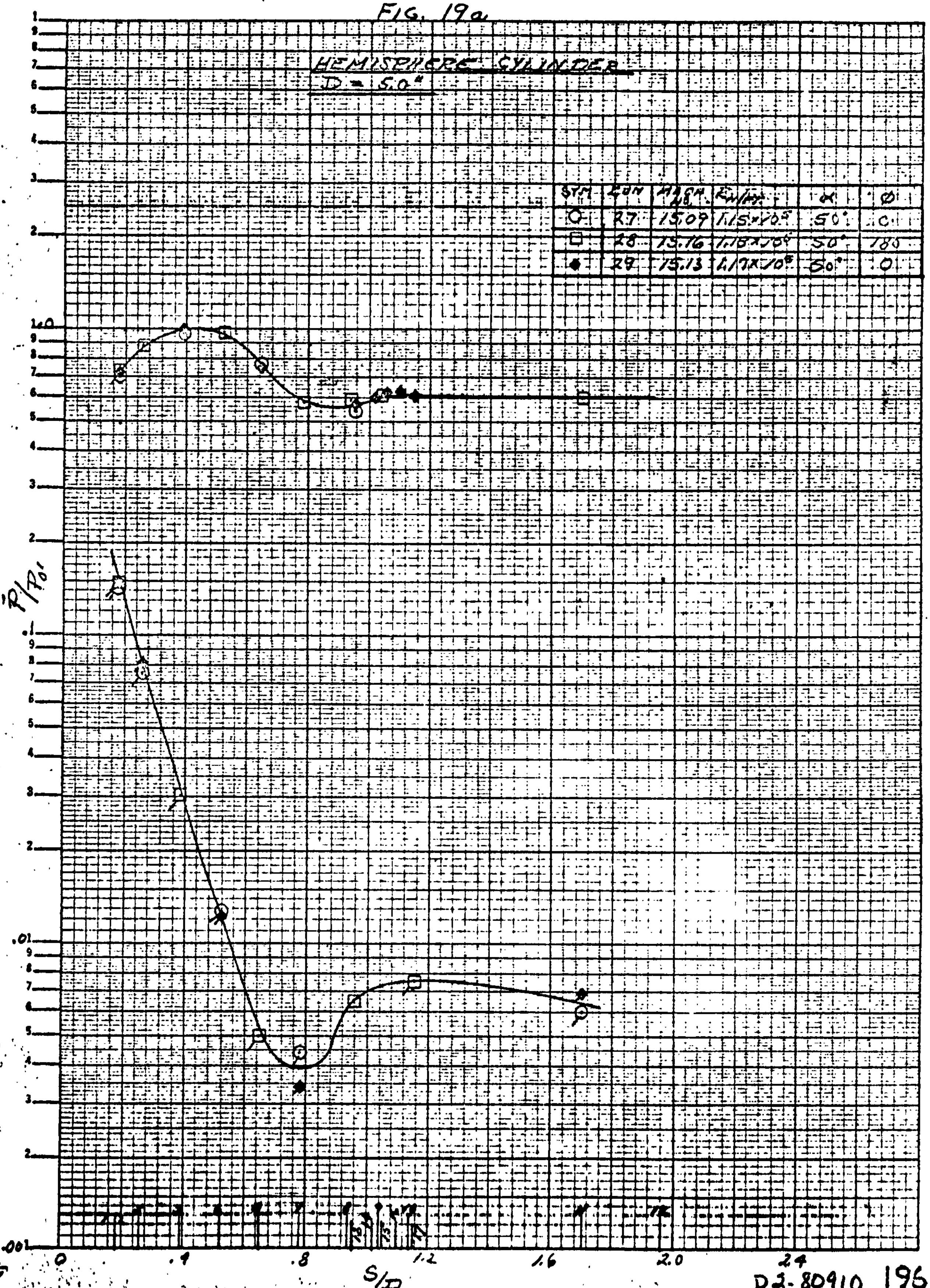
AT $\alpha = 50^{\circ}$

$M \approx 15.1$

$R_N/\text{ft.} \approx 1.1 \times 10^5$

FIGURE 19

FIG. 19a



HEMISPHERE CYLINDER
D = 5.0"
SYM	RUN	MACH NO.	Rn/FT	α	φ
○	27	15.09	1.15×10⁵	50°	0
□	28	15.16	1.18×10⁵	50°	180
●	29	15.13	1.17×10⁶	50°	0
P/P₀'
S/D
0
.4
.8
1.2
1.6
2.0
2.4
1.0
.1
.01
.001

FIG. 196

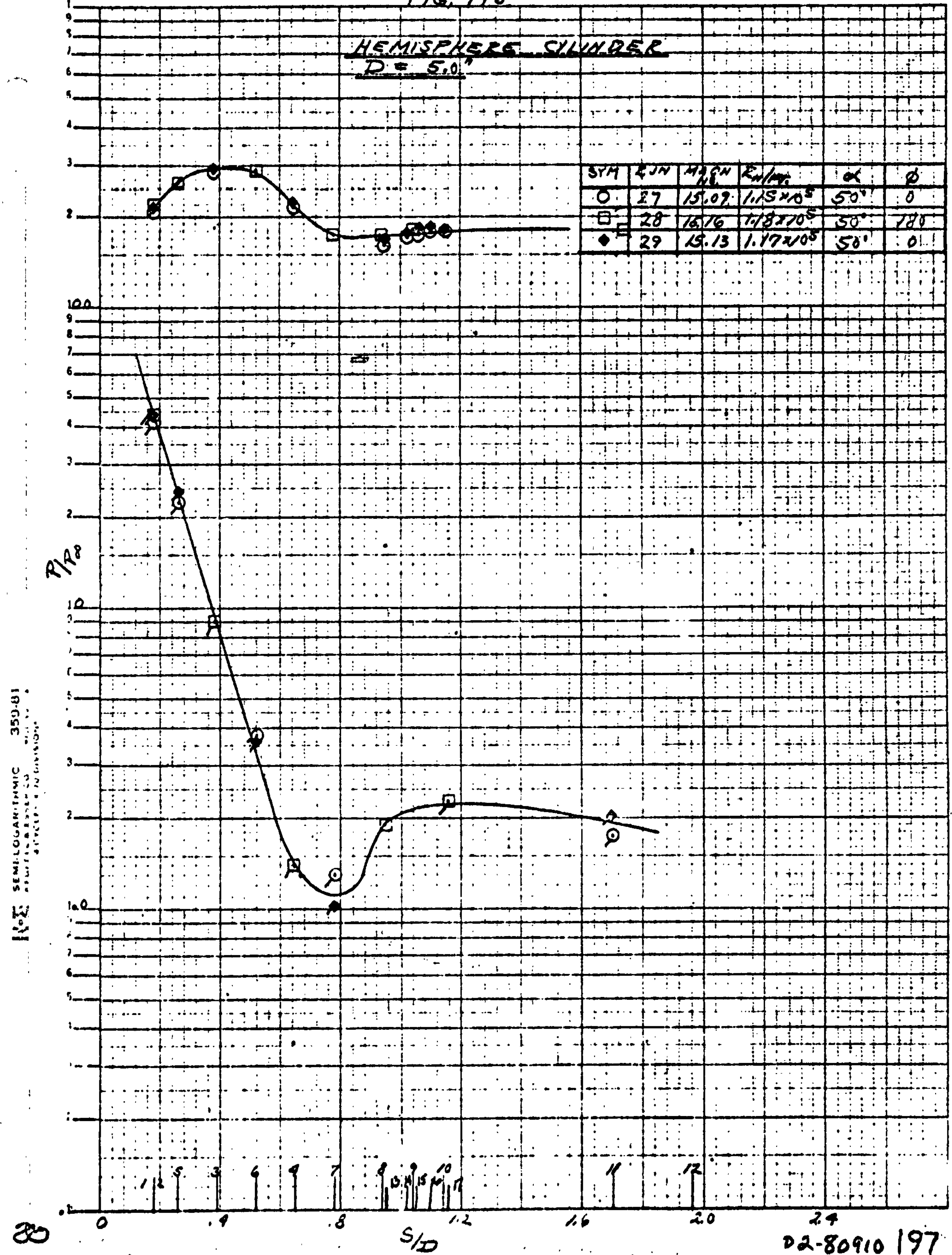
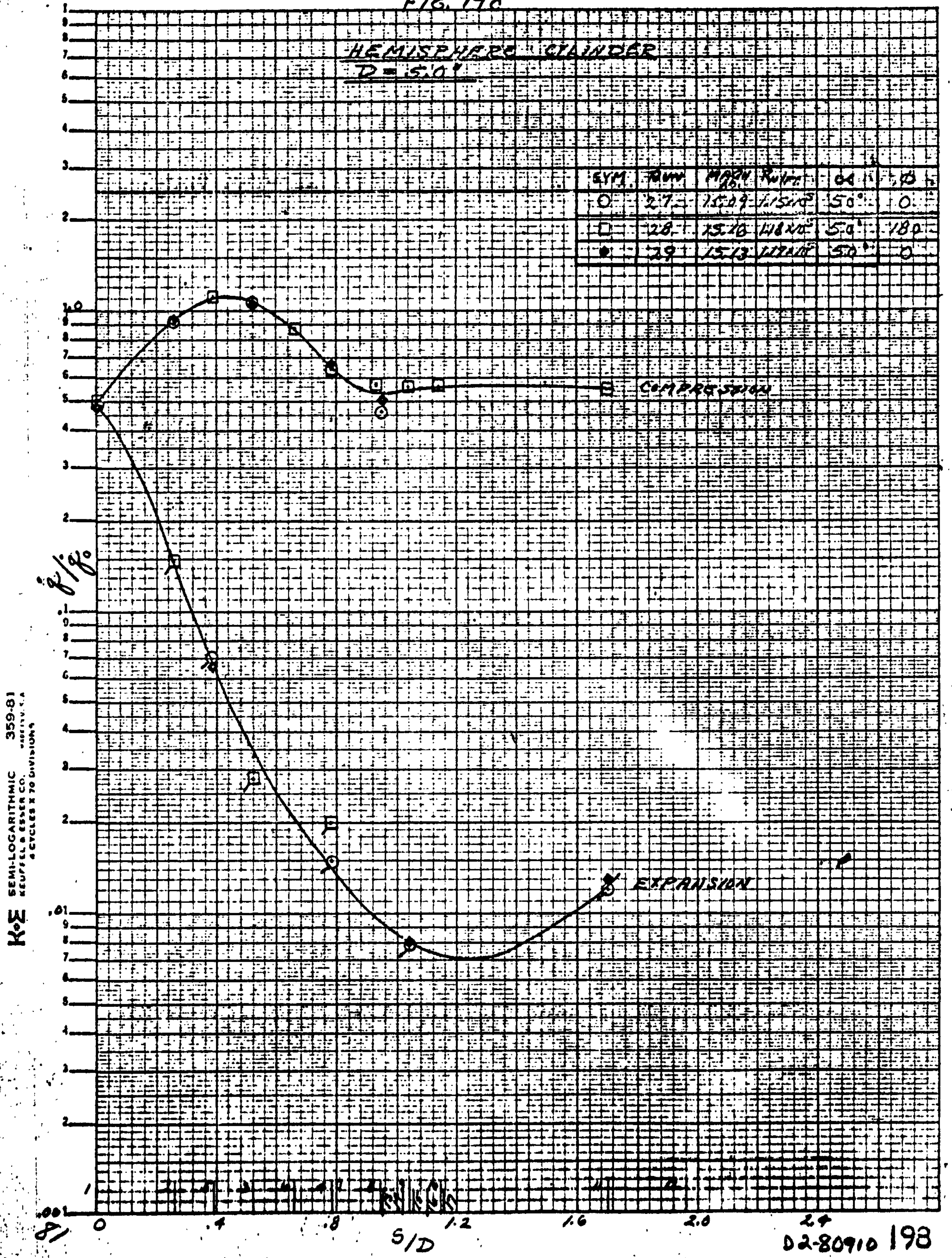

HEMISPHERE CYLINDER
D = 5.0"
SYM | RUN | MACH NO. | RN/FT. | α | φ
○ | 27 | 15.09 | 1.15×10^5 | 50° | 0
□ | 28 | 16.16 | 1.18×10^5 | 50° | 180
◆ | 29 | 15.13 | 1.17×10^5 | 50° | 0
P/P8
S/D
0
.4
.8
1.2
1.6
2.0
2.4
100
10
1.0

FIG. 19c


HEMISPHERE CYLINDER
D = 5.0"
SYM RUN MACH Rn/ft α φ
○ 27 15.09 1.15x10^5 50° 0
□ 28 15.18 1.18x10^5 50° 180
◆ 29 15.13 1.17x10^5 50° 0
COMPRESSION
EXPANSION
q/q0
S/D
0 .4 .8 1.2 1.6 2.0 2.4
K&E SEMI-LOGARITHMIC 359-81 KEUFFEL & ESSER CO. 4 CYCLES X 70 DIVISIONS

EFFECT OF ANGLE OF ATTACK ON THE AXIAL PRESSURE AND HEAT TRANSFER

DISTRIBUTION ON A SHARP FLATE PLATE

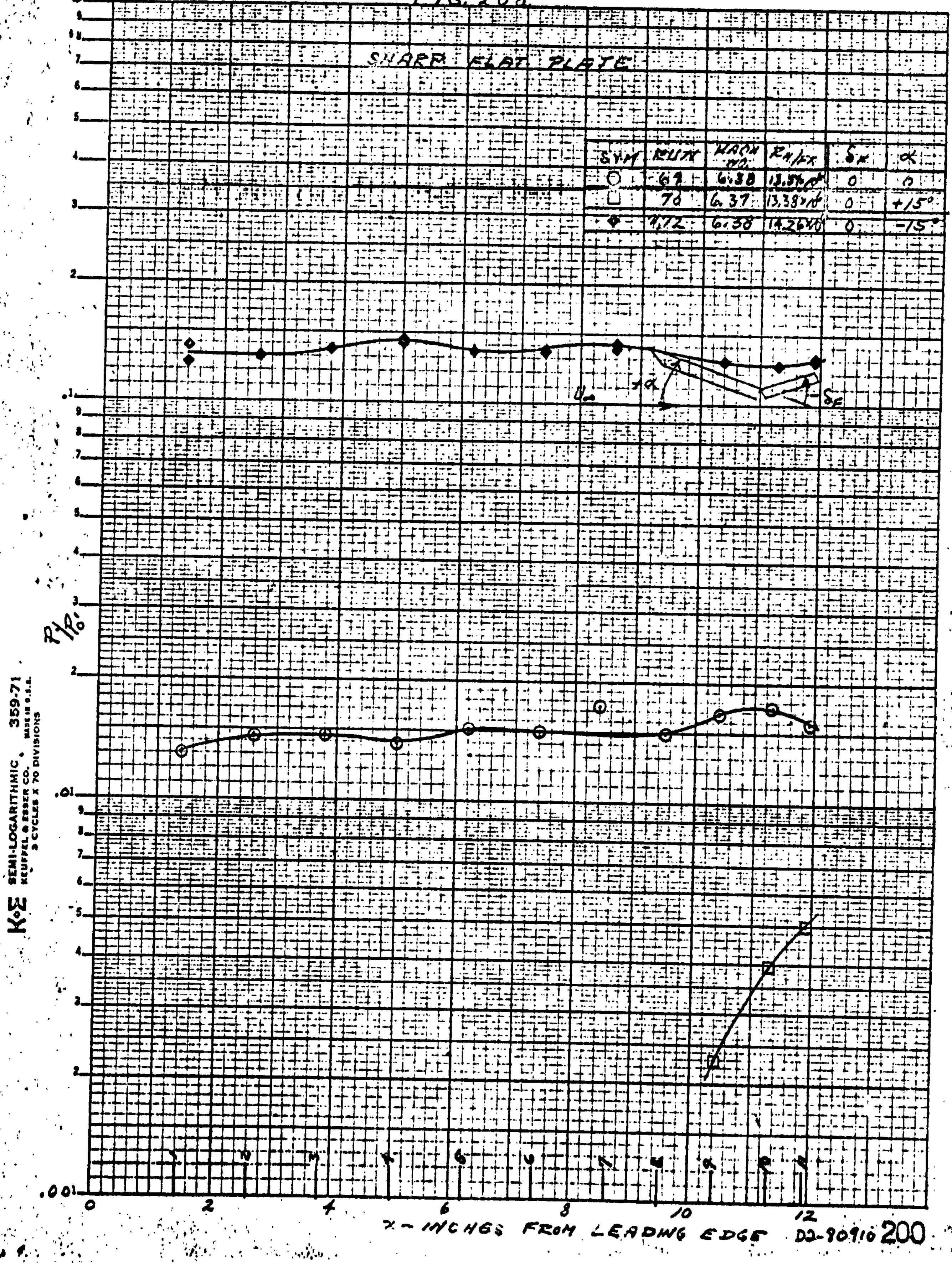
$\delta_F = 0^\circ$

$M_\infty = 6.38$

$R_N/ft. = 14 \times 10$

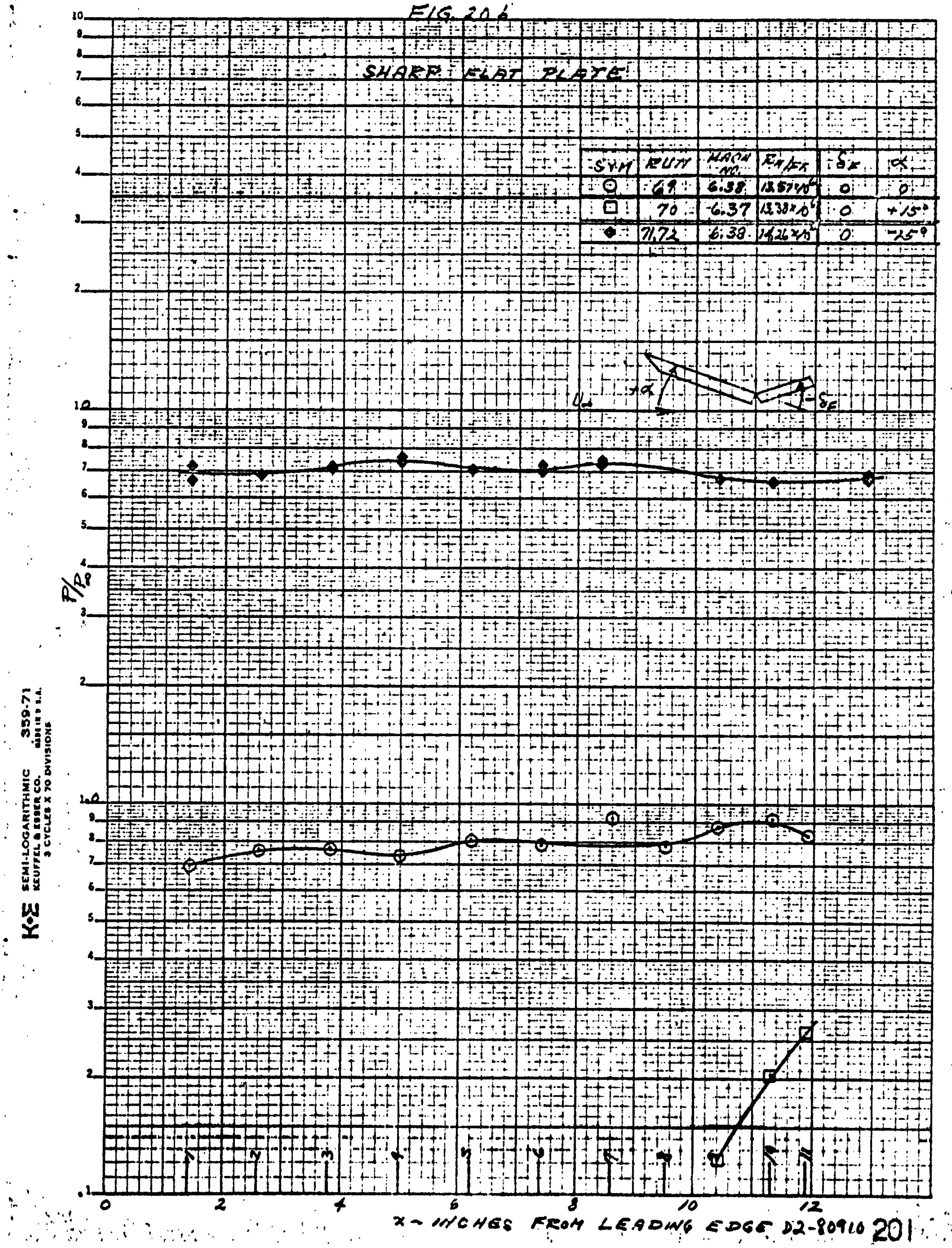
FIGURE 20

FIG. 20a



SHARP FLAT PLATE
SYM | RUN | MACH NO. | R_N/FT | δ_F | α
○ | 69 | 6.38 | 13.56×10⁶ | 0 | 0
□ | 70 | 6.37 | 13.38×10⁶ | 0 | +15°
◆ | 72 | 6.38 | 14.26×10⁶ | 0 | −15°
U_∞
$+\alpha$
δ_F
P/P_0'
K&E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS
10
1
.1
.01
.001
0
2
4
6
8
10
12
x – INCHES FROM LEADING EDGE

FIG. 20 b



SHARP FLAT PLATE
SYM RUN MACH NO. R_N/FT δ_F α
⊙ 69 6.38 13.57×10^6 0 0
□ 70 6.37 13.38×10^6 0 +15°
◆ 71,72 6.38 14.26×10^6 0 -15°
U_∞
$+\alpha$
$-\delta_F$
P/P∞
x ~ INCHES FROM LEADING EDGE
KE SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 20C

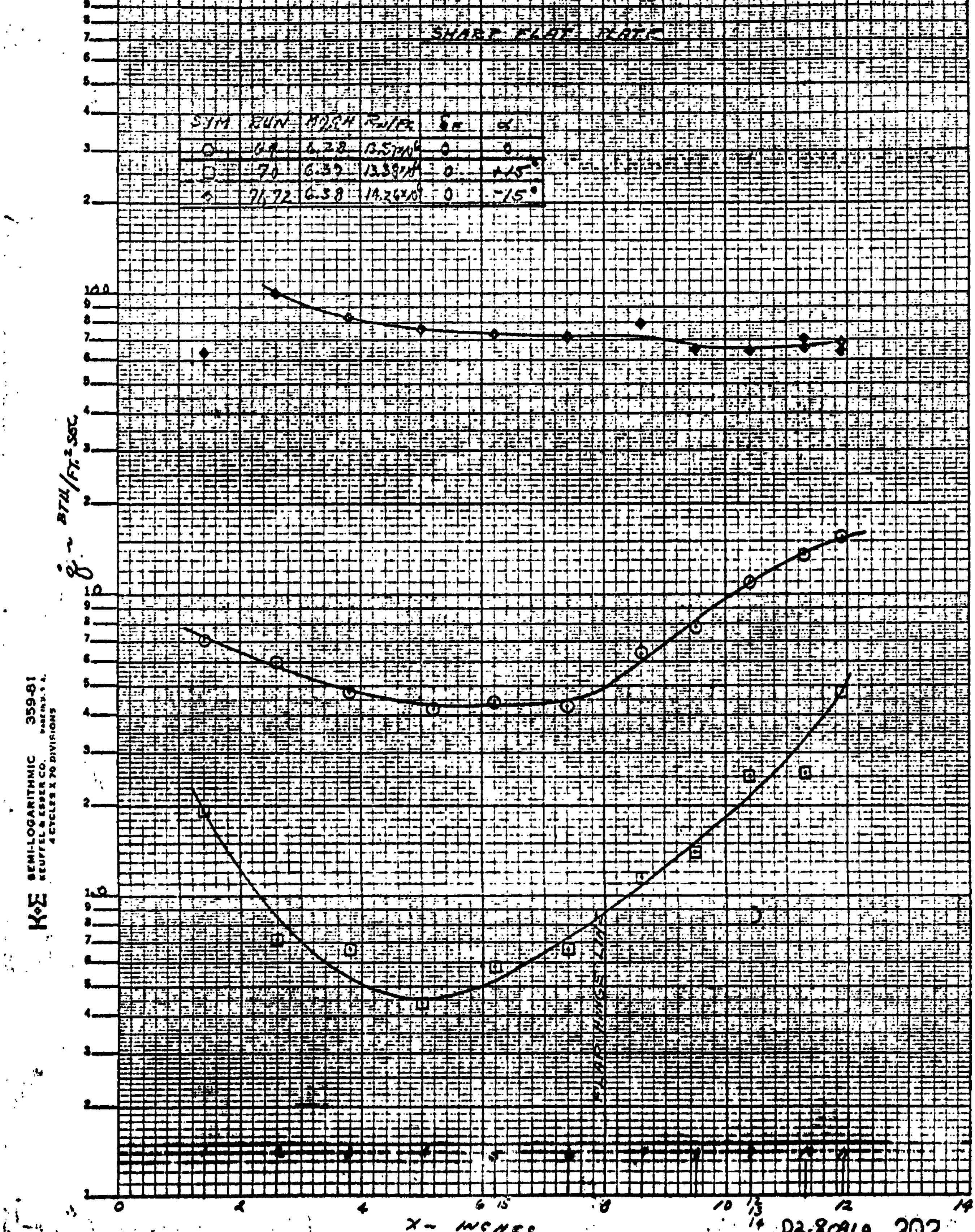
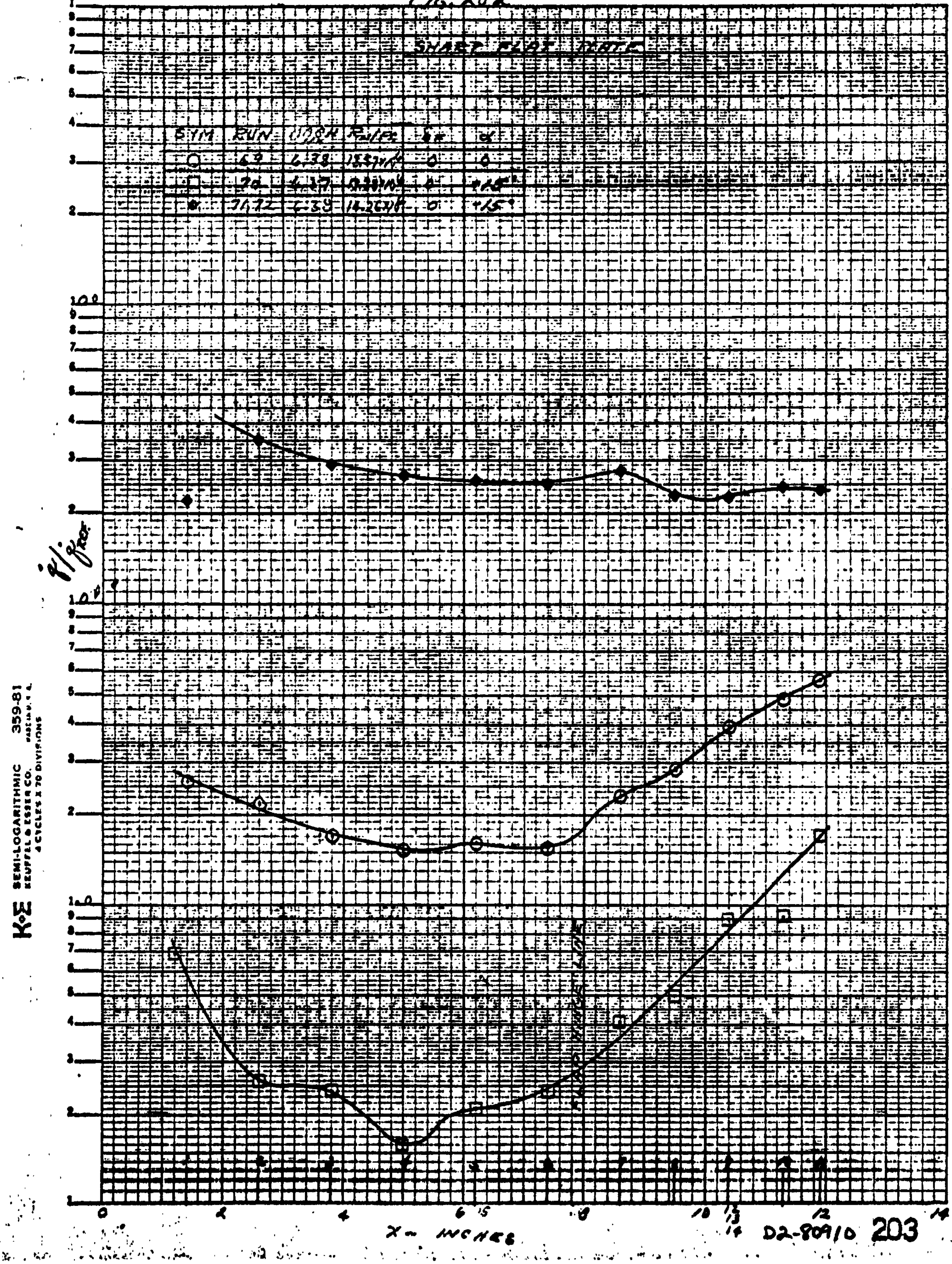

SHARP FLAT PLATE
SYM RUN M/SH R_e/FT δ_e α
○ 69 6.28 13.57×10^6 0 0
□ 70 6.37 13.38×10^6 0 +15°
◇ 71,72 6.38 14.26×10^6 0 -15°
$\dot{q}$ ~ BTU/FT.^{2} SEC
X ~ INCHES
HINGE LINE
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 20d



SHARP FLAP
SYM
RUN
69
6.38
70
71,72
X ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

EFFECT OF ANGLE OF ATTACK ON THE AXIAL PRESSURE AND HEAT TRANSFER DISTRIBUTION ON A SHARP FLAT PLATE

$\delta_F = 0$

$M = 15.1$

$R_N/ft. = 1.15 \times 10^5$

FIGURE 21

FIG. 21a

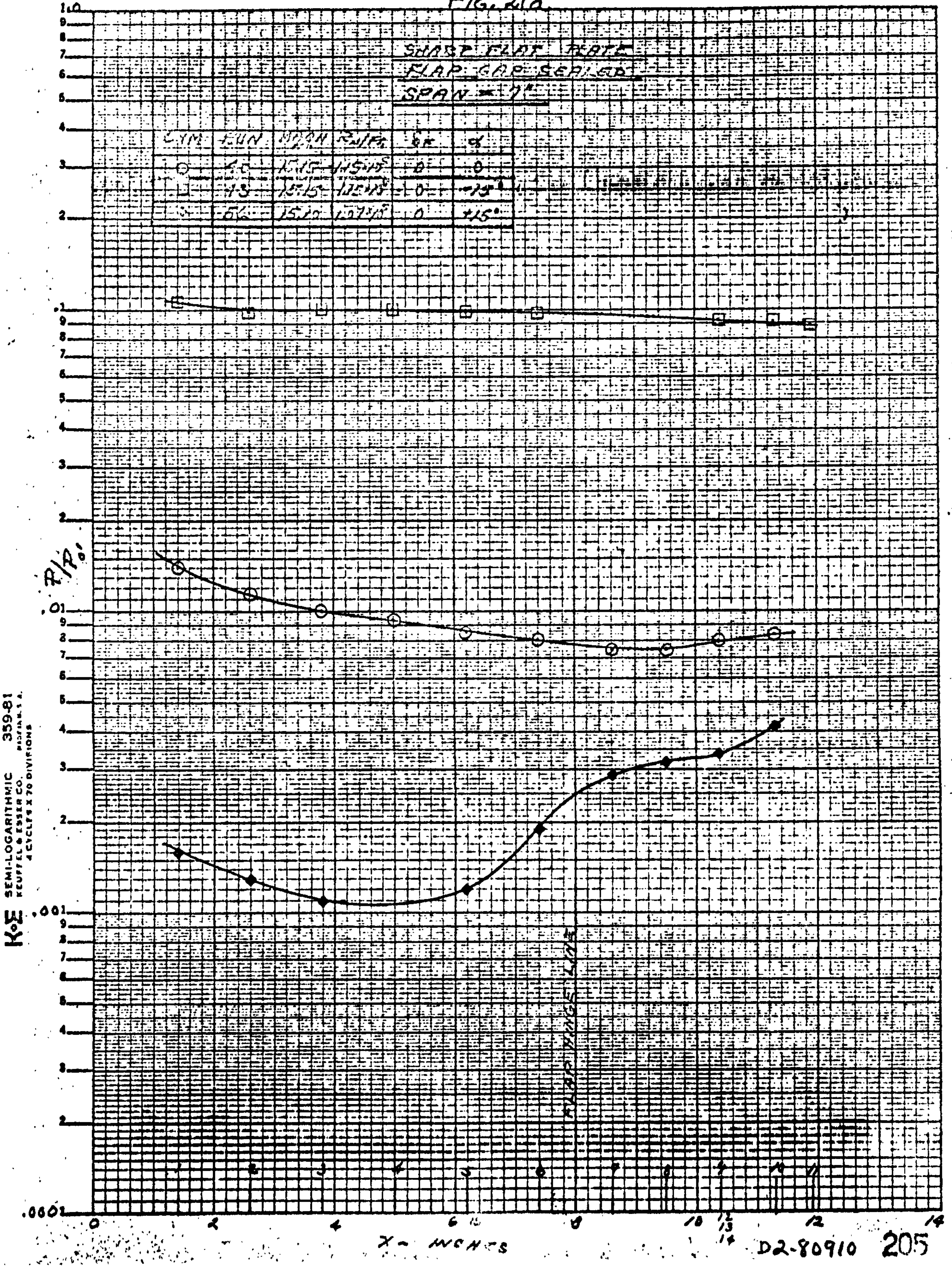

SHARP FLAT PLATE
FLAP GAP SEALED
SPAN = 7"
SYM RUN
P/P₀'
FLAP HINGE LINE
X ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 21b

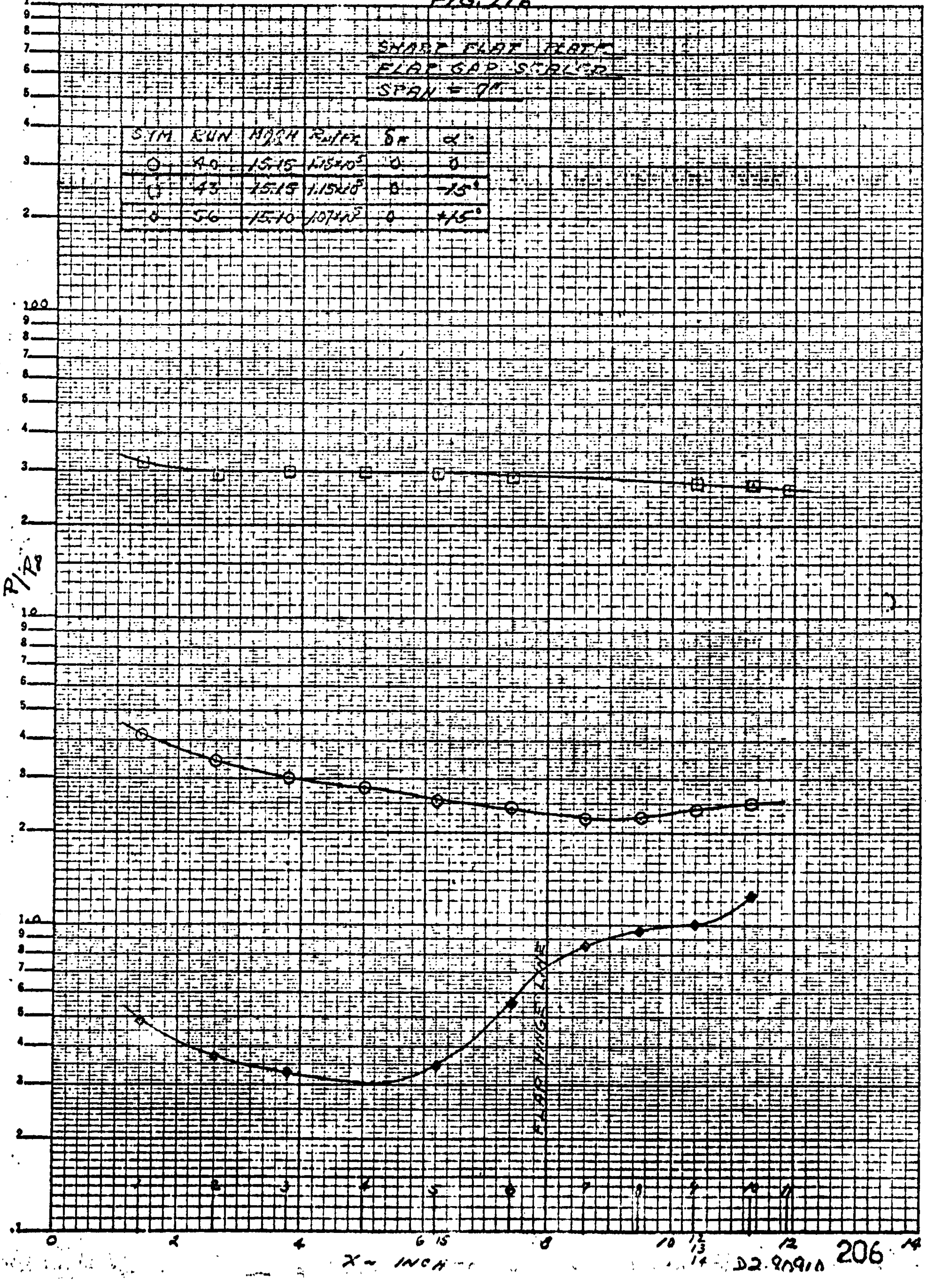
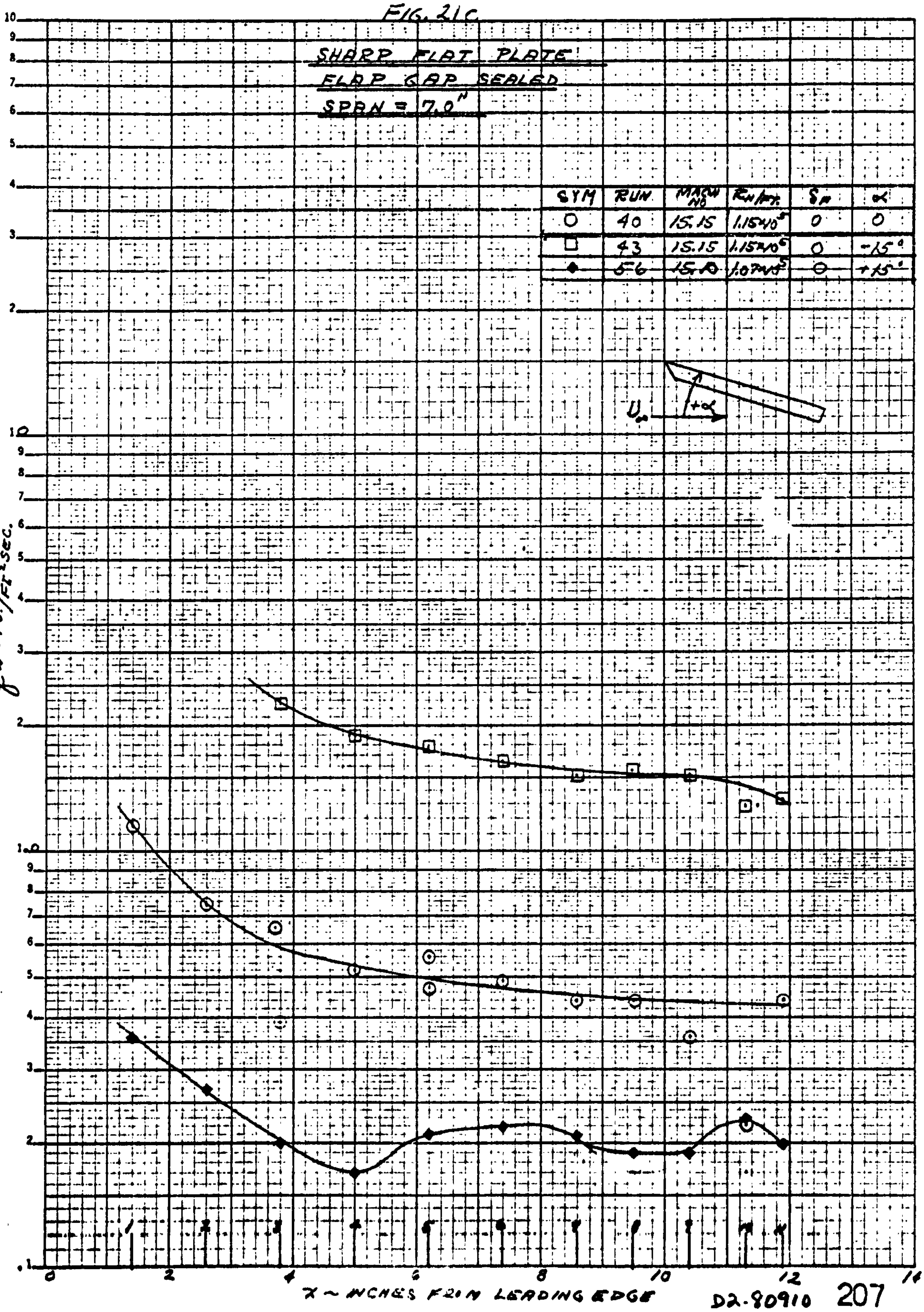
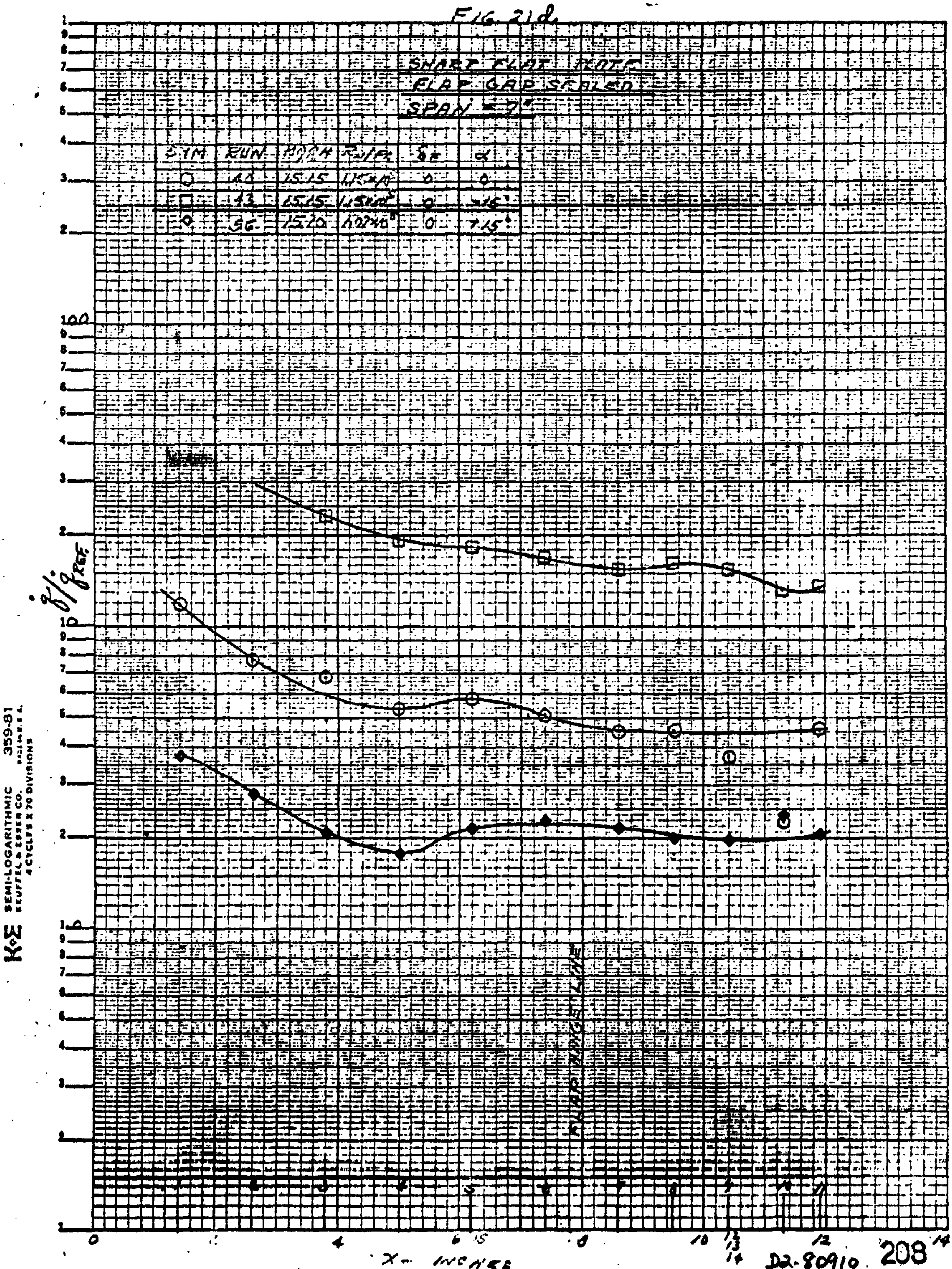

SHARP FLAT PLATE
FLAP GAP SEALED
SPAN = 0"
SYM RUN MACH R_N/FT δ_F α
○ 40 15.15 1.15×10^5 0 0
□ 43 15.15 1.15×10^5 0 -15°
◇ 56 15.10 1.07×10^5 0 +15°
P/P8
FLAP HINGE LINE
X ~ INCH
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 21C



K+E SEMI-LOGARITHMIC 359-71 KEUFFEL & ESSER CO. MADE IN U.S.A. 3 CYCLES X 70 DIVISIONS

FIG. 21d.


SHARP FLAT PLATE
FLAP GAP SEALED
SPAN = 7"
SYM
RUN
MACH
α
$\dot{q}/\dot{q}_{REF}$
X - INCHES
FLAP HINGE LINE
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

EFFECT OF FLAP DEFLECTIONS ON PRESSURE AND HEAT TRANSFER

DISTRIBUTION ON A SHARP FLAT PLATE

$\alpha = 0$

$M_{\infty} = 6.38$

$R_N/ft. = 14 \times 10^6$

FIGURE 22

FIG. 22a

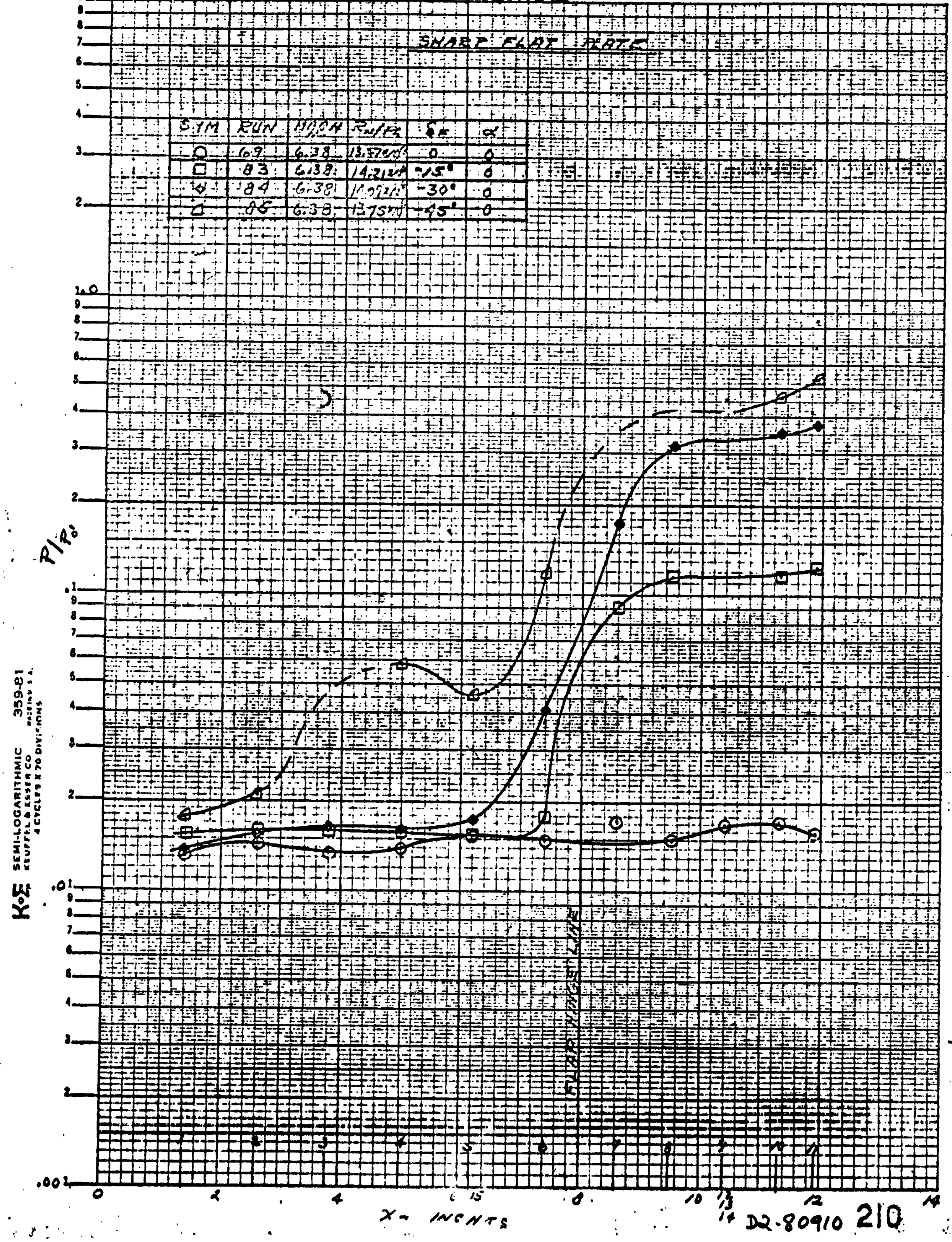

SHARP FLAT PLATE
SYM RUN MACH Rn/FT
69 6.38
83 6.38 -15° 0
84 6.38 -30° 0
85 6.38 -45° 0
P/P0
FLAP HINGE LINE
X ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 22b

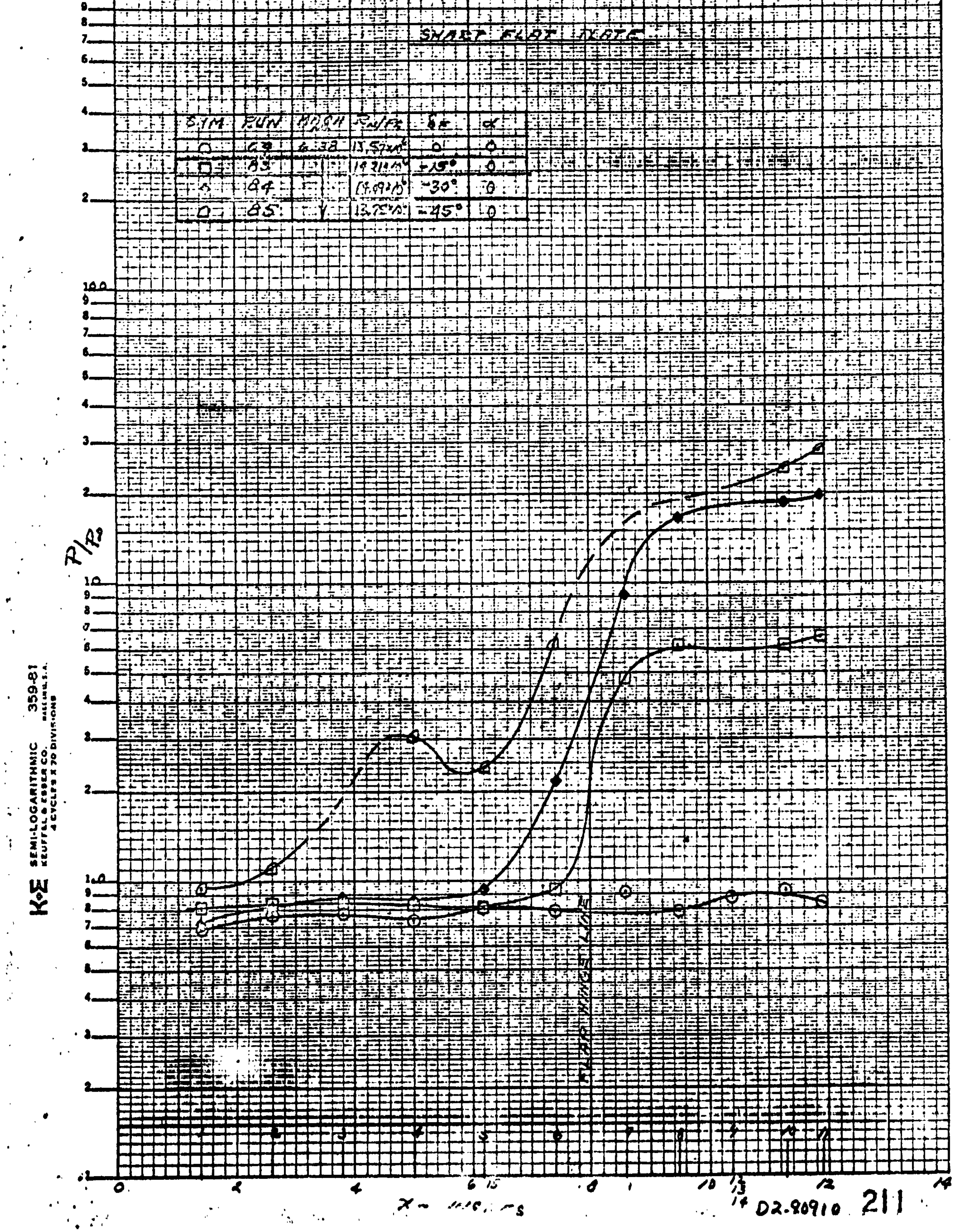
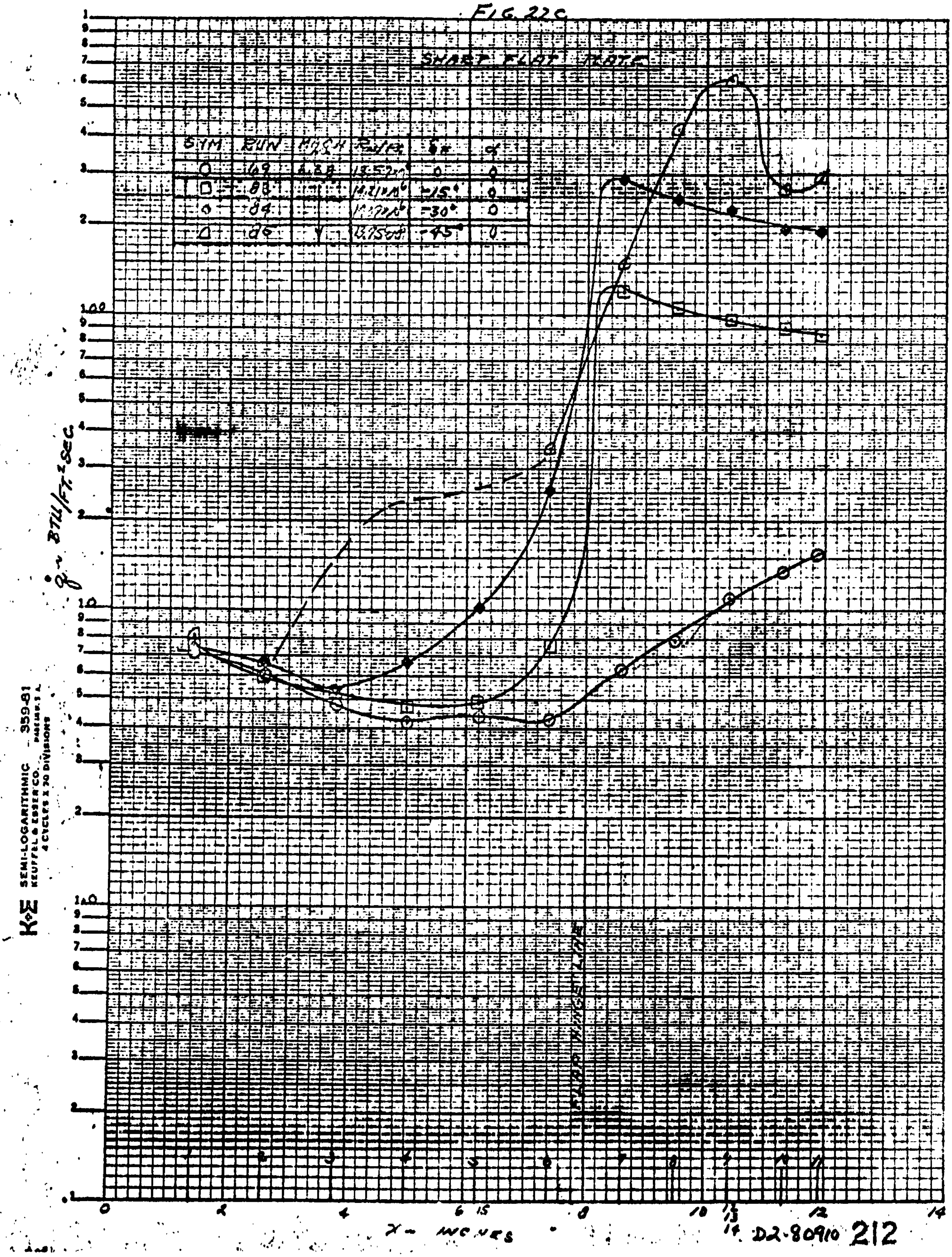

SHARP FLAT PLATE
SYM
RUN
MACH
6.38
δ_F
α
83
84
85
+15°
−30°
−45°
P/P_0
FLAP HINGE LINE

FIG. 22C



SHARP FLAT PLATE
SYM RUN MACH
169
88
84
86
0
-15°
-30°
-45°
$\dot{q}$ ~ BTU/FT.² SEC
X ~ INCHES
FLAP HINGE LINE

EFFECT OF FLAP DEFLECTIONS ON PRESSURE AND HEAT TRANSFER

DISTRIBUTION ON A SHARP FLAT PLATE

$\alpha = 0^{o}$

$M_{\infty} = 15.1$

$R_N/ft. = 1.15 \times 10^5$

FIGURE 23

FIG 23b

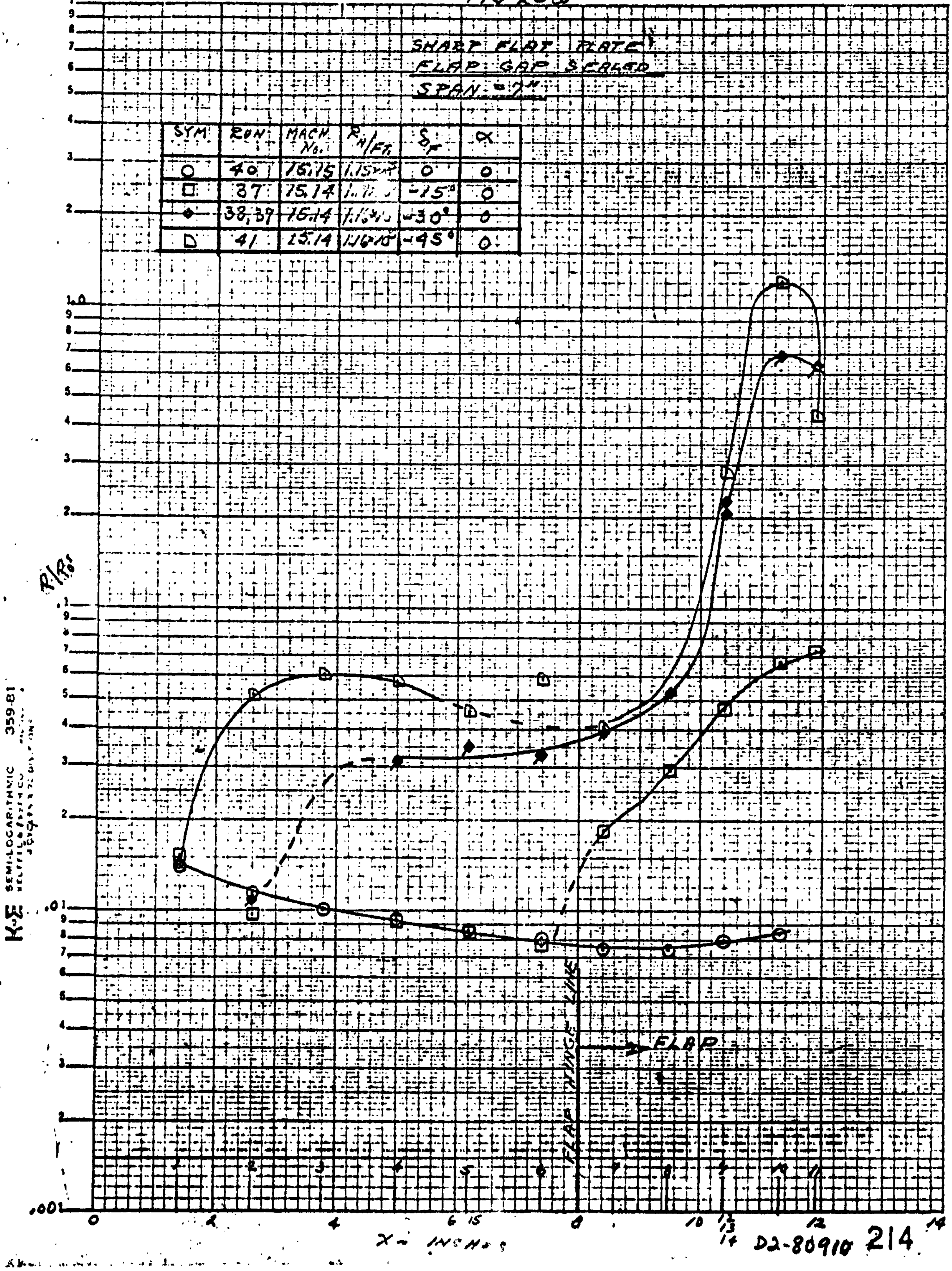
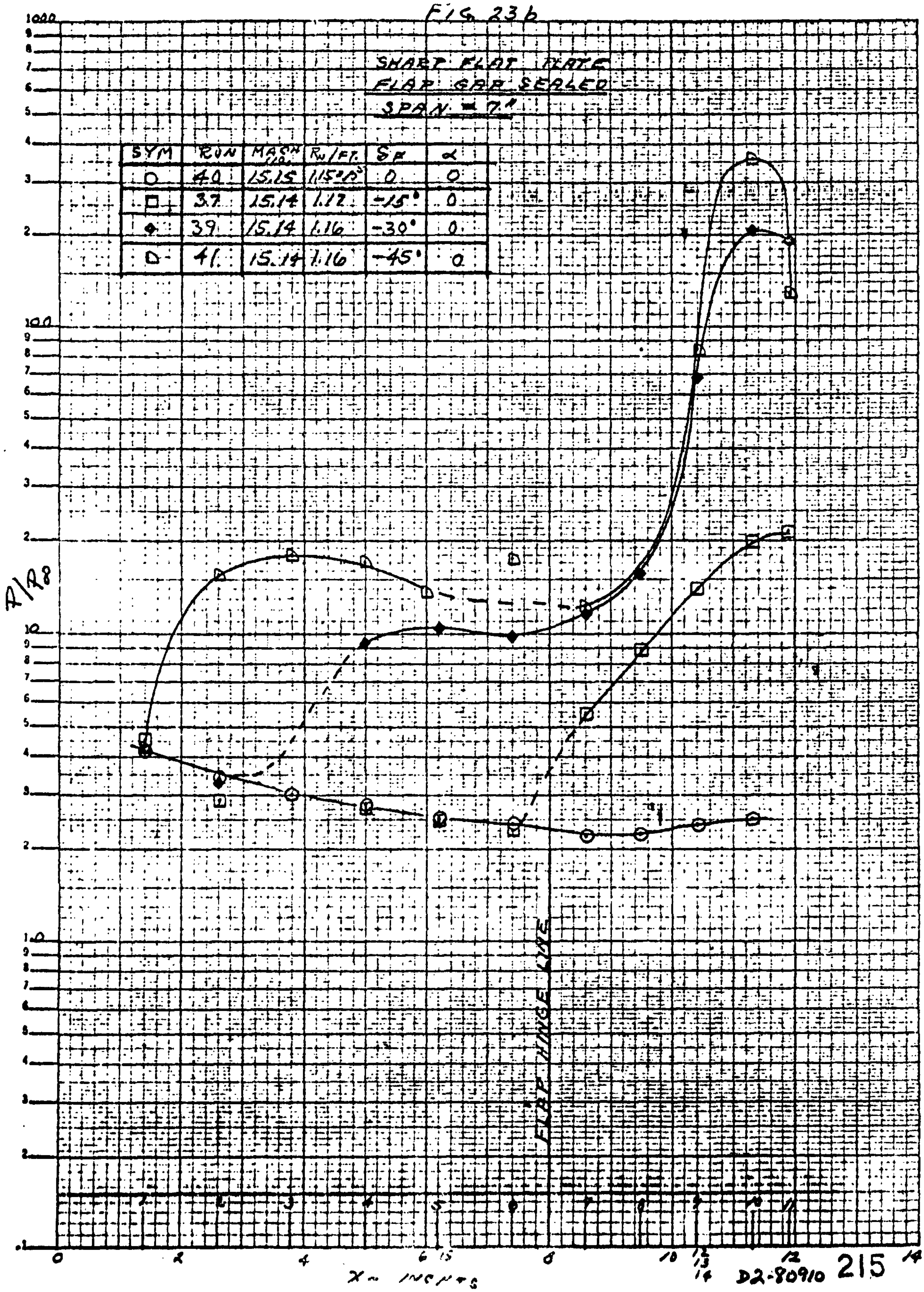

SHARP FLAT PLATE
FLAP: GAP SEALED
SPAN = 7"
SYM | RUN | MACH. No. | R_N/FT. | δ_F | α
○ | 40 | 15.15 | 1.15×10⁶ | 0° | 0
□ | 37 | 15.14 | | -15° | 0
◆ | 38,39 | 15.14 | | -30° | 0
D | 41 | 15.14 | 1.16×10⁶ | -45° | 0
R/R_0
FLAP HINGE LINE
FLAP
X ~ INCHES
K&E SEMI-LOGARITHMIC 359-81

FIG. 23b



SHARP FLAT PLATE
FLAP GAP SEALED
SPAN = 7"
SYM RUN MACH Rn/FT. δF α
○ 40 15.15 1.15×10^5 0 0
□ 37 15.14 1.17 -15° 0
◆ 39 15.14 1.16 -30° 0
▷ 41 15.14 1.16 -45° 0
P/P8
FLAP HINGE LINE
X ~ INCHES

FIG. 23C

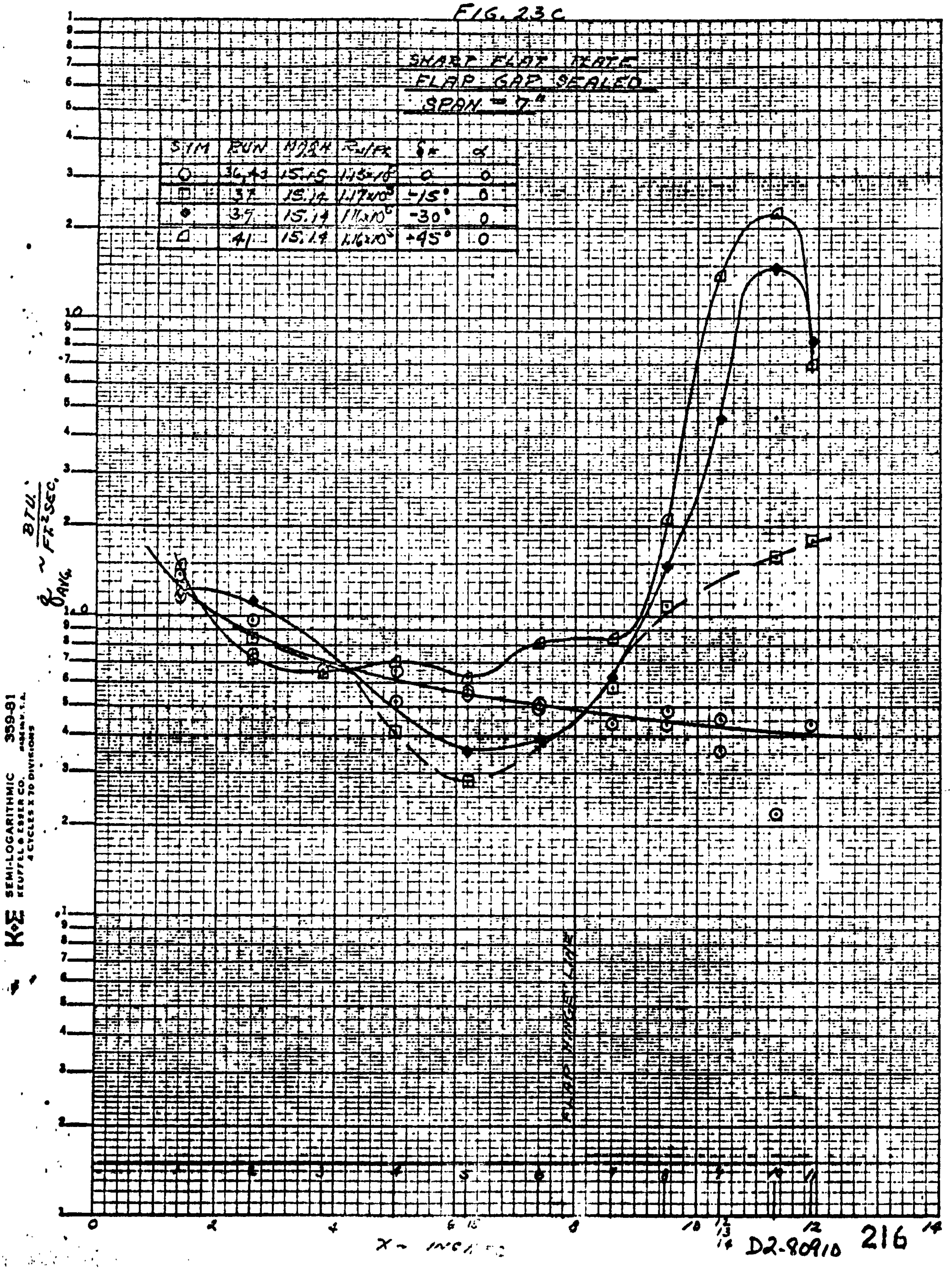
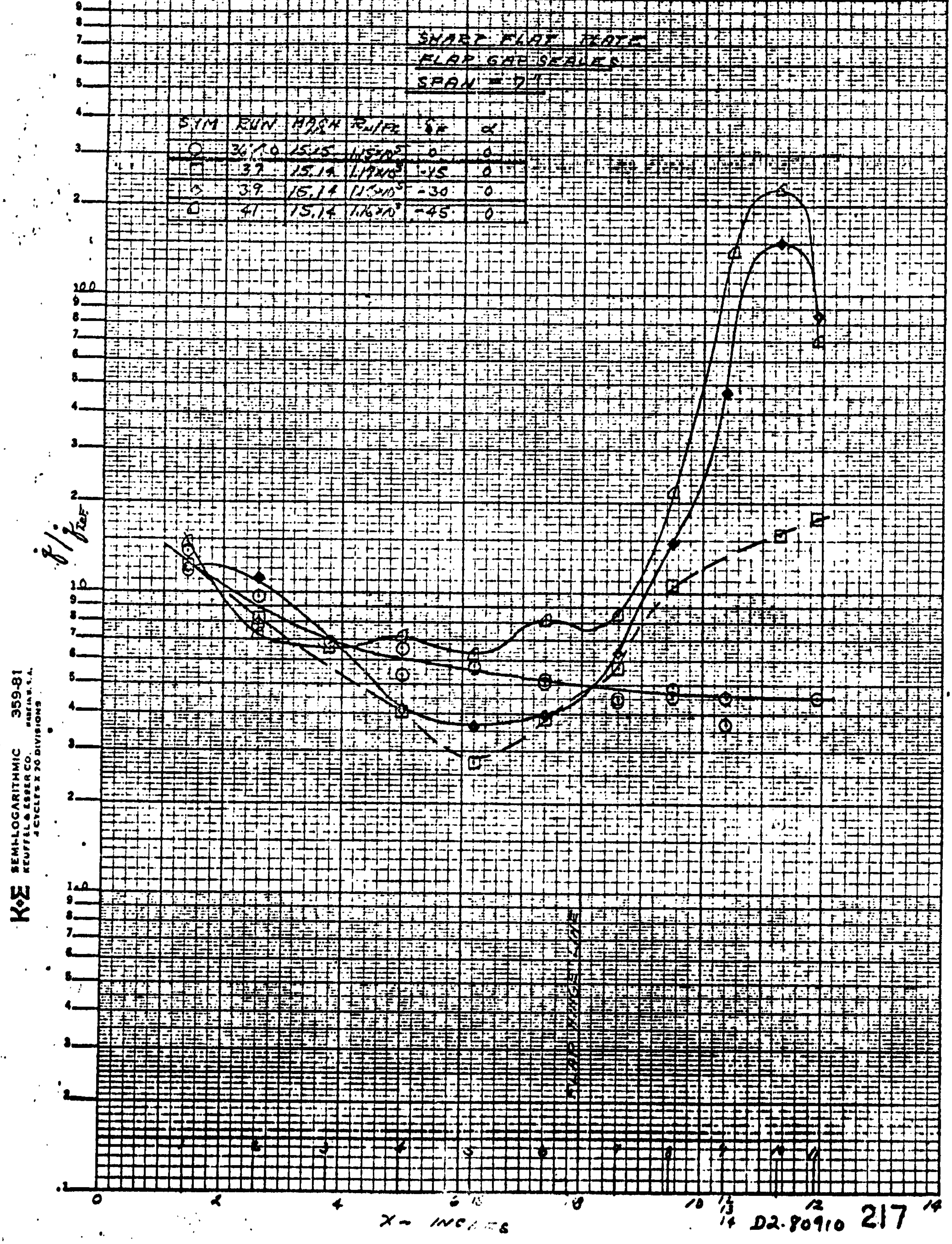

SHARP FLAT PLATE
FLAP GAP SEALED
SPAN = 7"
SYM RUN MACH Re/FT δF α
○ 36,43 15.15 1.15x10^6 0 0
□ 37 15.14 1.17x10^6 -15° 0
◆ 39 15.14 1.16x10^6 -30° 0
△ 41 15.14 1.16x10^6 +45° 0
q AVG ~ BTU/FT² SEC
FLAP HINGE LINE
X ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 23d


SHARP FLAT PLATE
FLAP GAP SEALED
SPAN = 7"
SYM RUN MACH R_N/FT δ_F α
○ 36 10 15.15 1.15×10^5 0 0
□ 37 15.14 1.19×10^5 -15 0
◇ 39 15.14 1.15×10^5 -30 0
▢ 41 15.14 1.16×10^5 -45 0
$\dot{q}/\dot{q}_{REF}$
X ~ INCHES
FLAP HINGE LINE
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO. MADE IN U.S.A.
4 CYCLES X 70 DIVISIONS

EFFECT OF FLAP DEFLECTIONS ON THE PRESSURE AND HEAT TRANSFER DISTRIBUTION ON A SHARP FLAT PLATE

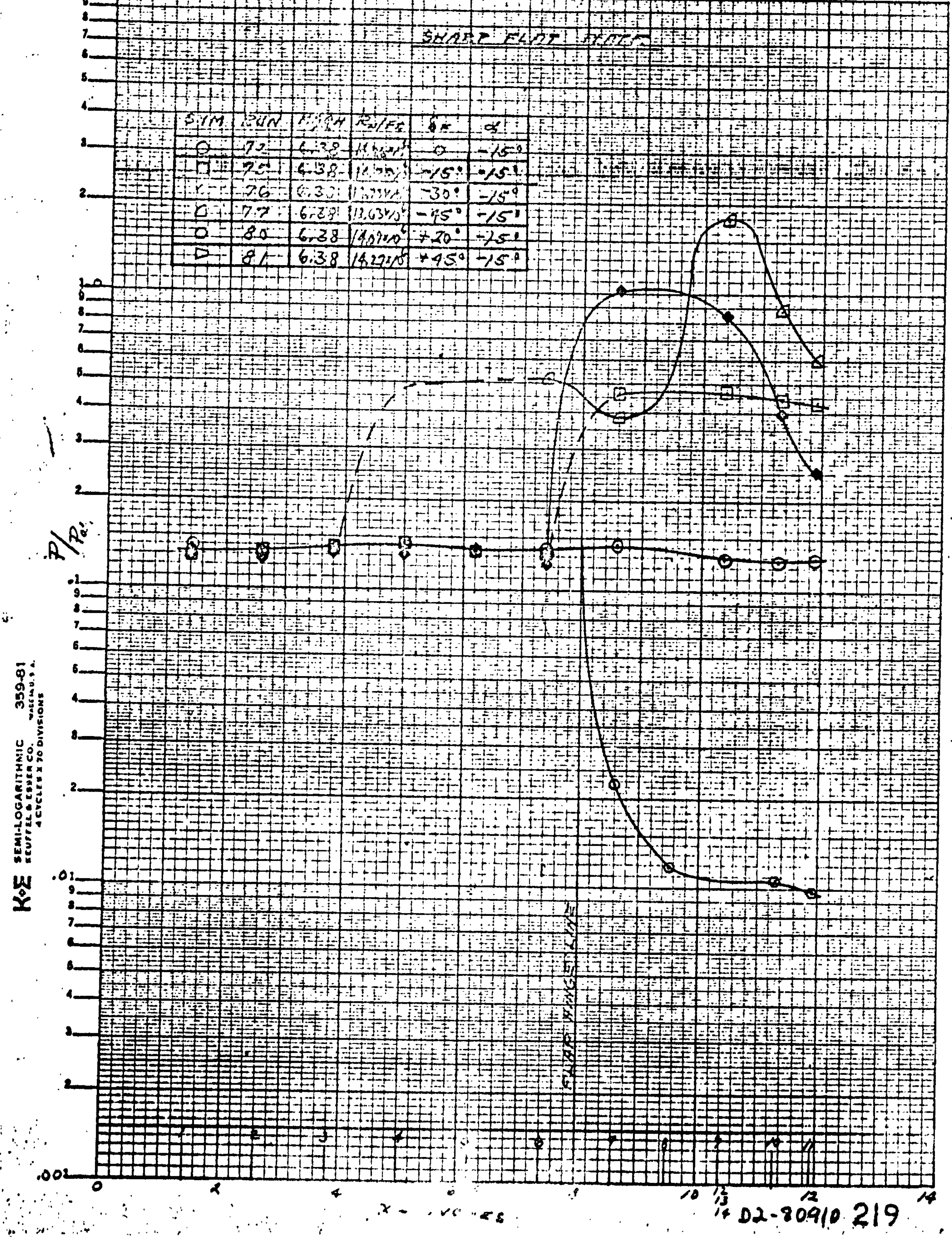
$\alpha = -15^\circ$

$M_\infty = 6.38$

$R_N/\text{ft.} = 14 \times 10^6$

FIGURE 24

FIG. 24a



SHARP FLAT
SYM. RUN
72 6.38 0 -15°
75 6.38 -15° -15°
76 6.38 -30° -15°
77 6.38 -45° -15°
80 6.38 +20° -15°
81 6.38 +45° -15°
P/P∞
FLAP HINGE LINE
KE SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 246

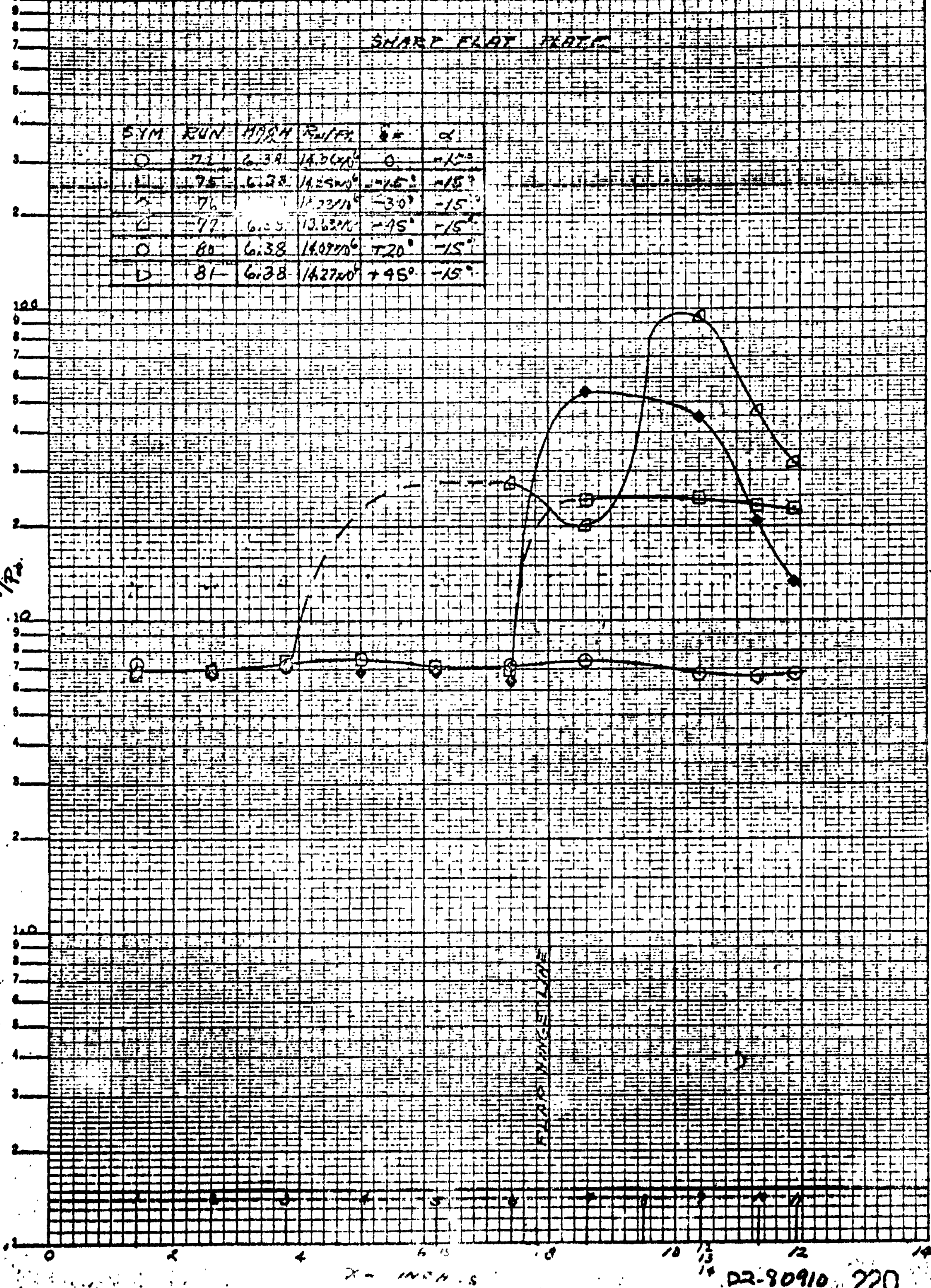
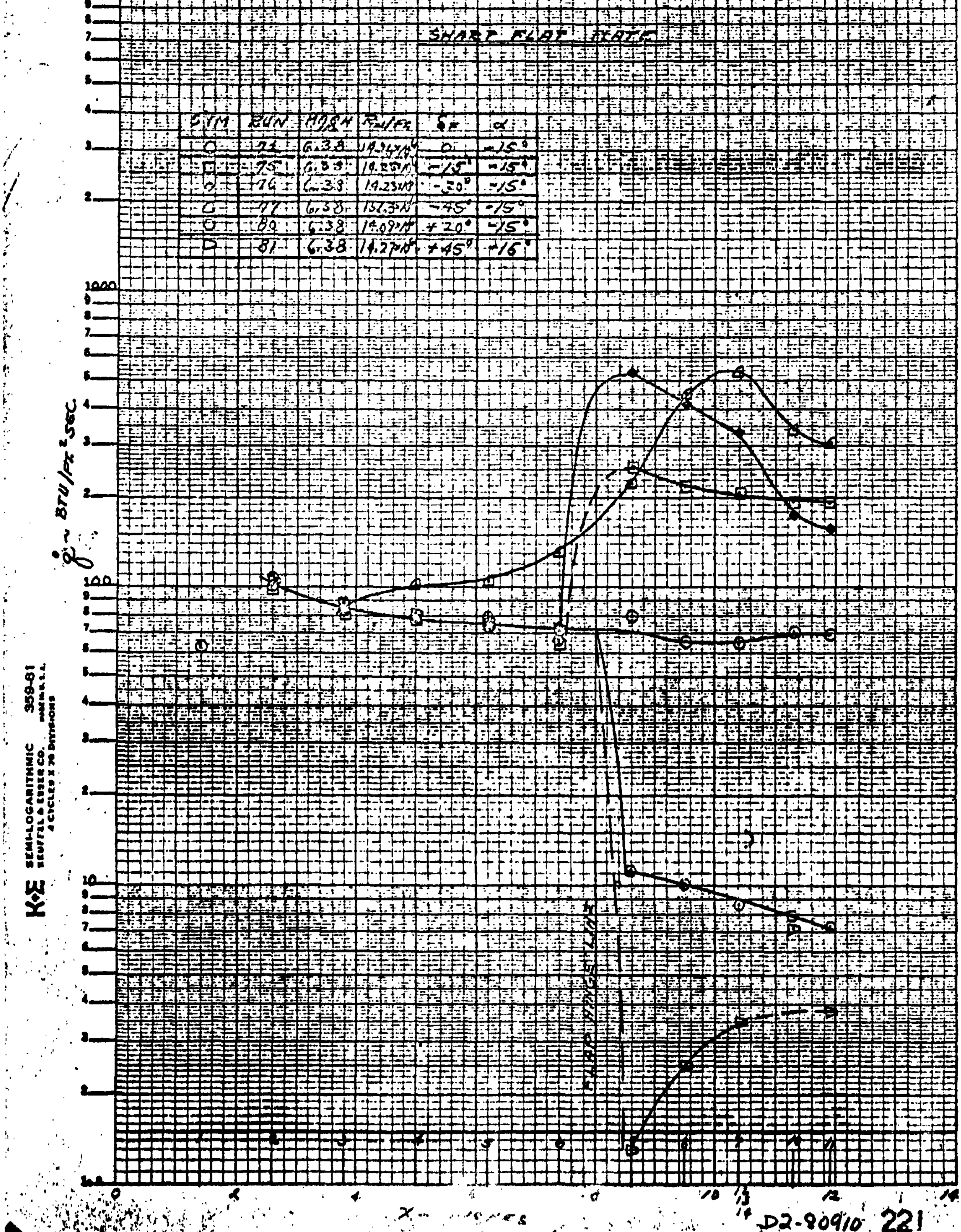

SHARP FLAT PLATE
SYM RUN MACH Rn/FT. δ* α
71 6.38 14.36x10^6 0 -15°
75 6.38 14.25x10^6 -15° -15°
76 14.23x10^6 -30° -15°
77 13.62x10^6 -45° -15°
80 6.38 14.09x10^6 +20° -15°
81 6.38 14.27x10^6 +45° -15°
P/P∞
FLAP HINGE LINE
X - INCHES
KE SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 24b


SHARP FLAT PLATE
SYM RUN M0 RN/FT δF α
71 6.38 0 -15°
75 6.38 -15° -15°
76 6.38 14.23x10^6 -30° -15°
77 6.38 -45° -15°
80 6.38 +20° -15°
81 6.38 +45° -16°
BTU/FT² SEC
FLAP HINGE LINE
X ~ INCHES
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

EFFECT OF FLAP DEFLECTIONS ON THE PRESSURE AND HEAT TRANSFER

DISTRIBUTION ON A SHARP FLAT PLATE

$\alpha = -15^{\circ}$

$M_{\infty} = 15.1$

$R_N/\text{ft.} = 1.1 \times 10^5$

FIGURE 25

FIG. 25a

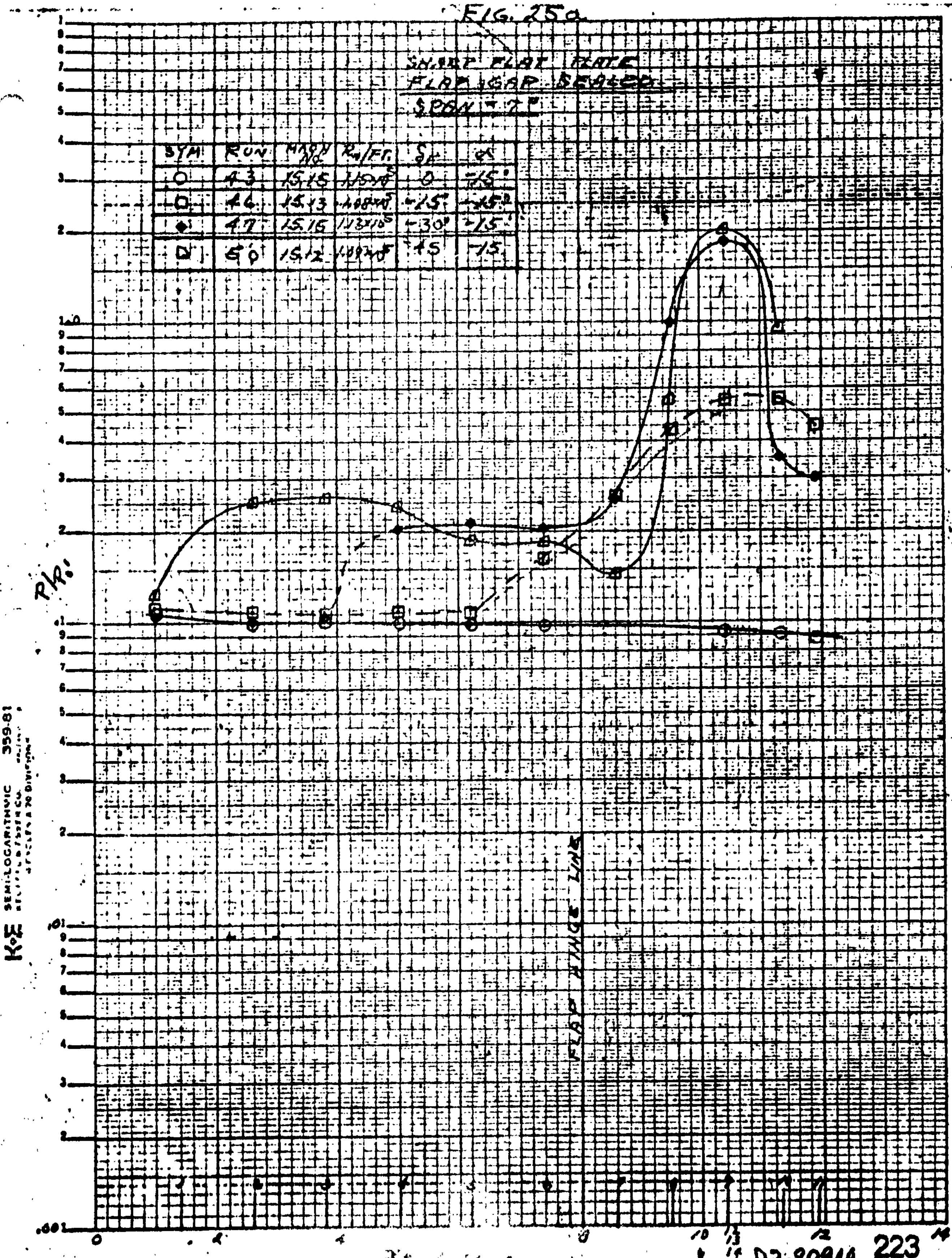

SWEPT FLAT PLATE
FLAP GAP SEALED
SYM RUN MACH No. Rn/FT. δ α
O 43 15.15 1.15x10^5 0 -15°
□ 46 15.13 1.08x10^5 -15° -15°
◆ 47 15.16 1.13x10^5 -30° -15°
D 50 15.12 1.09x10^5 -15 -15
P/P0
FLAP HINGE LINE
K&E SEMI-LOGARITHMIC 359-81

FIG. 25b

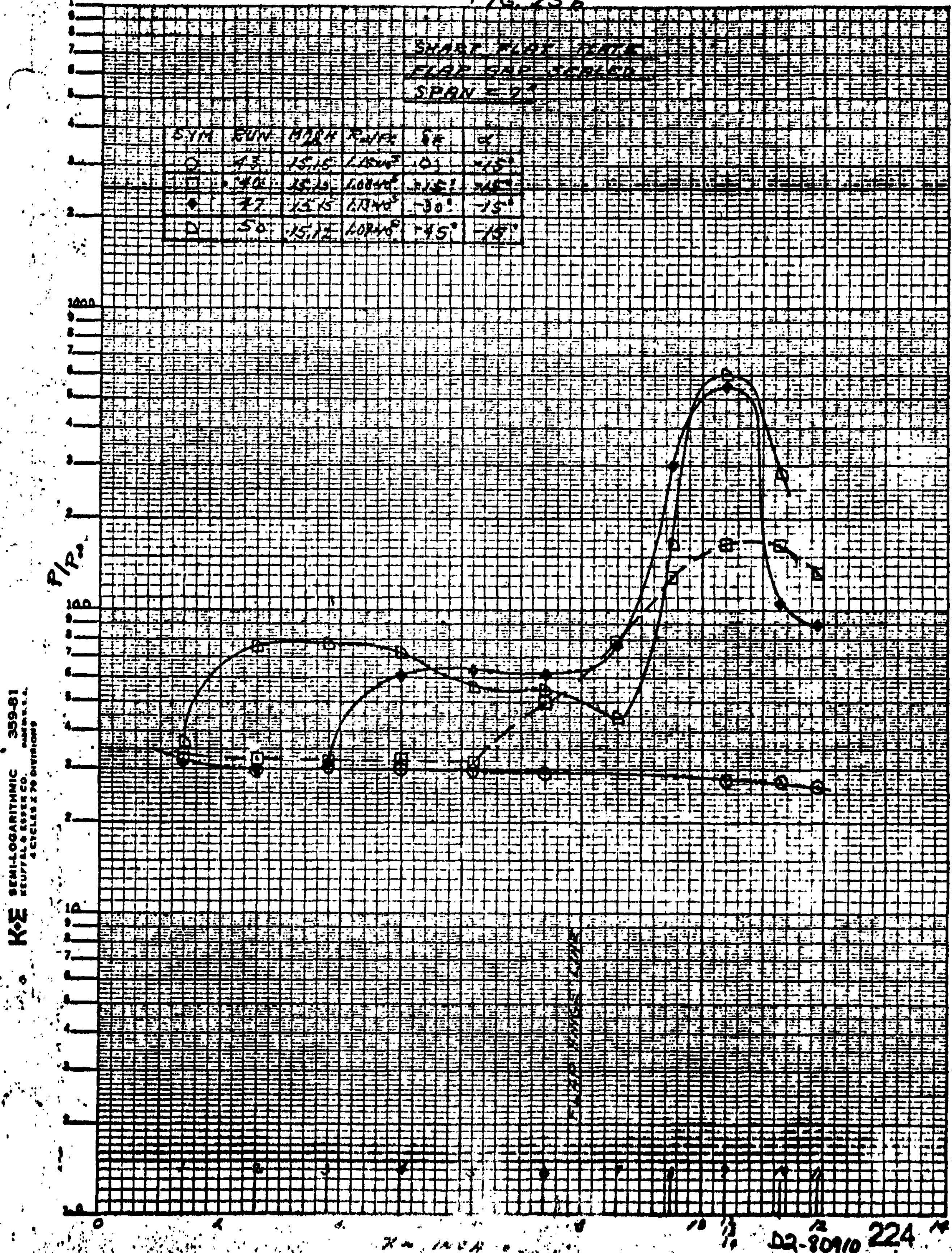
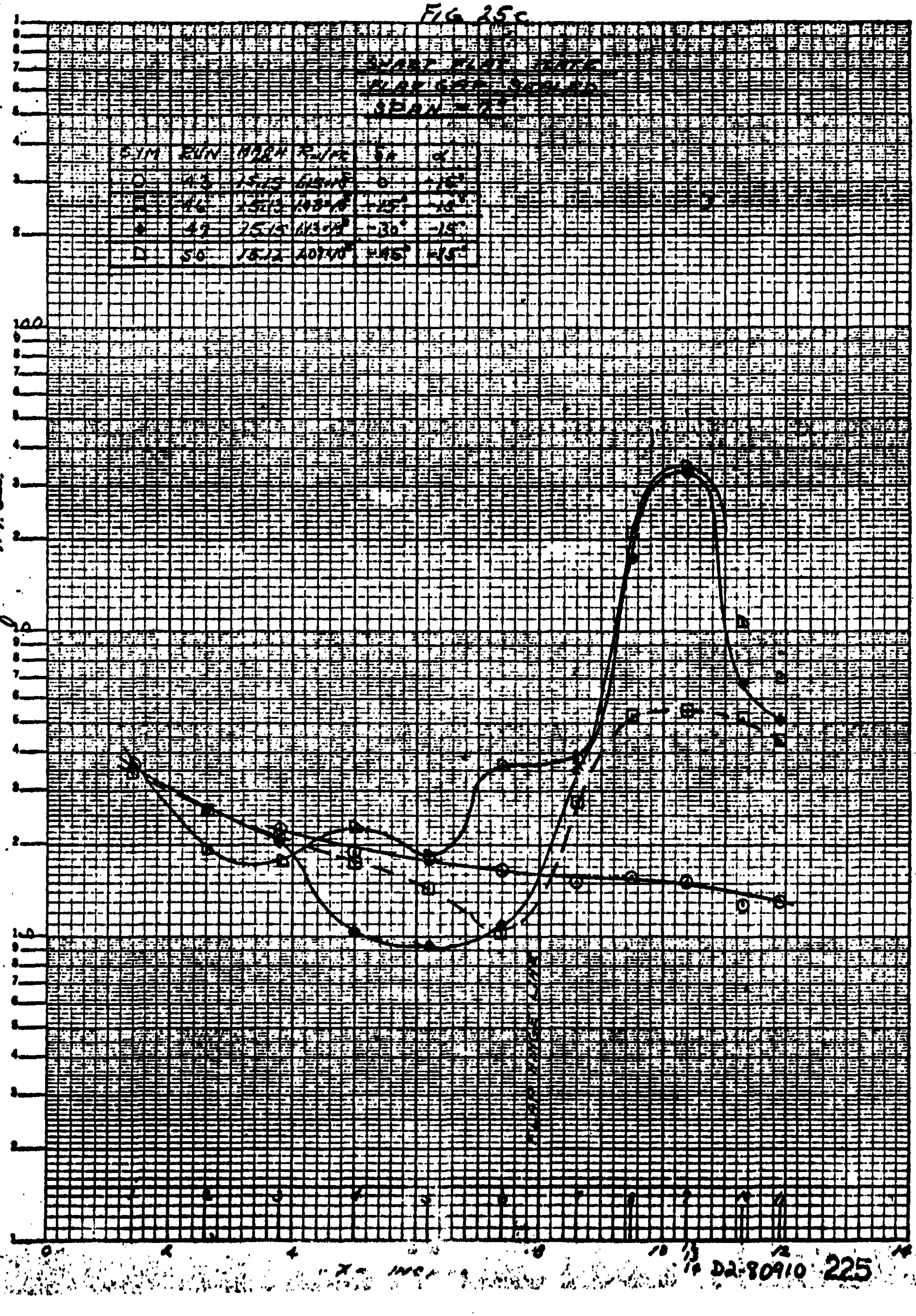
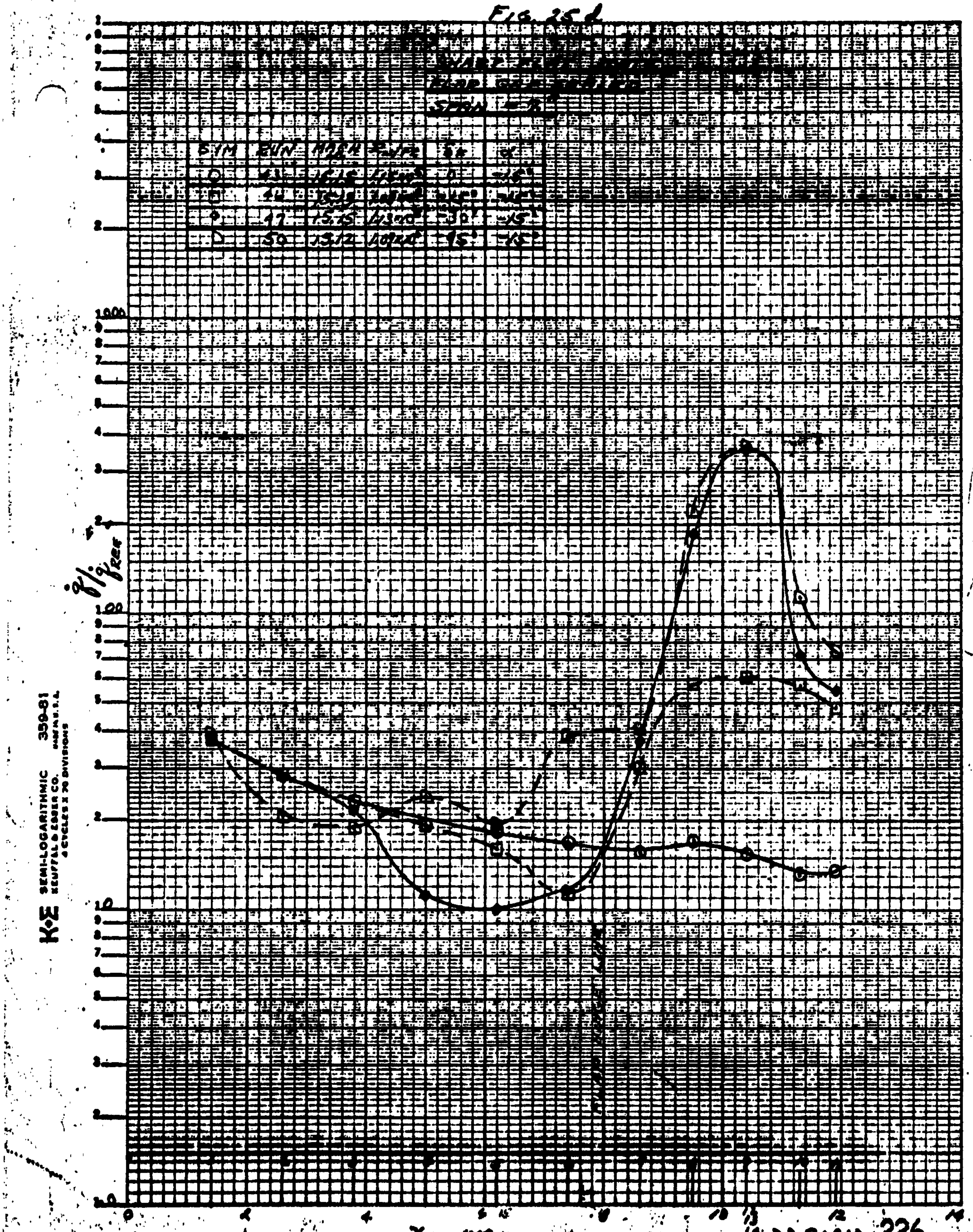


FIG 25C



SYM RUN MACH
○ 45
46
◆ 49
□ 50
$\dot{q}$ ~ BTU/FT.² SEC.
X ~ INCH
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 25d



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EFFECT OF FLAP DEFLECTIONS ON THE PRESSURE AND HEAT TRANSFER

DISTRIBUTION ON A SHARP FLAT PLATE

$\alpha = -15^{o}$

$M_{\infty} = 15.1$

$R_N/ft. = 1.1 \times 10^5$

FLAP GAP OPEN

FIGURE 26

FIG. 26a

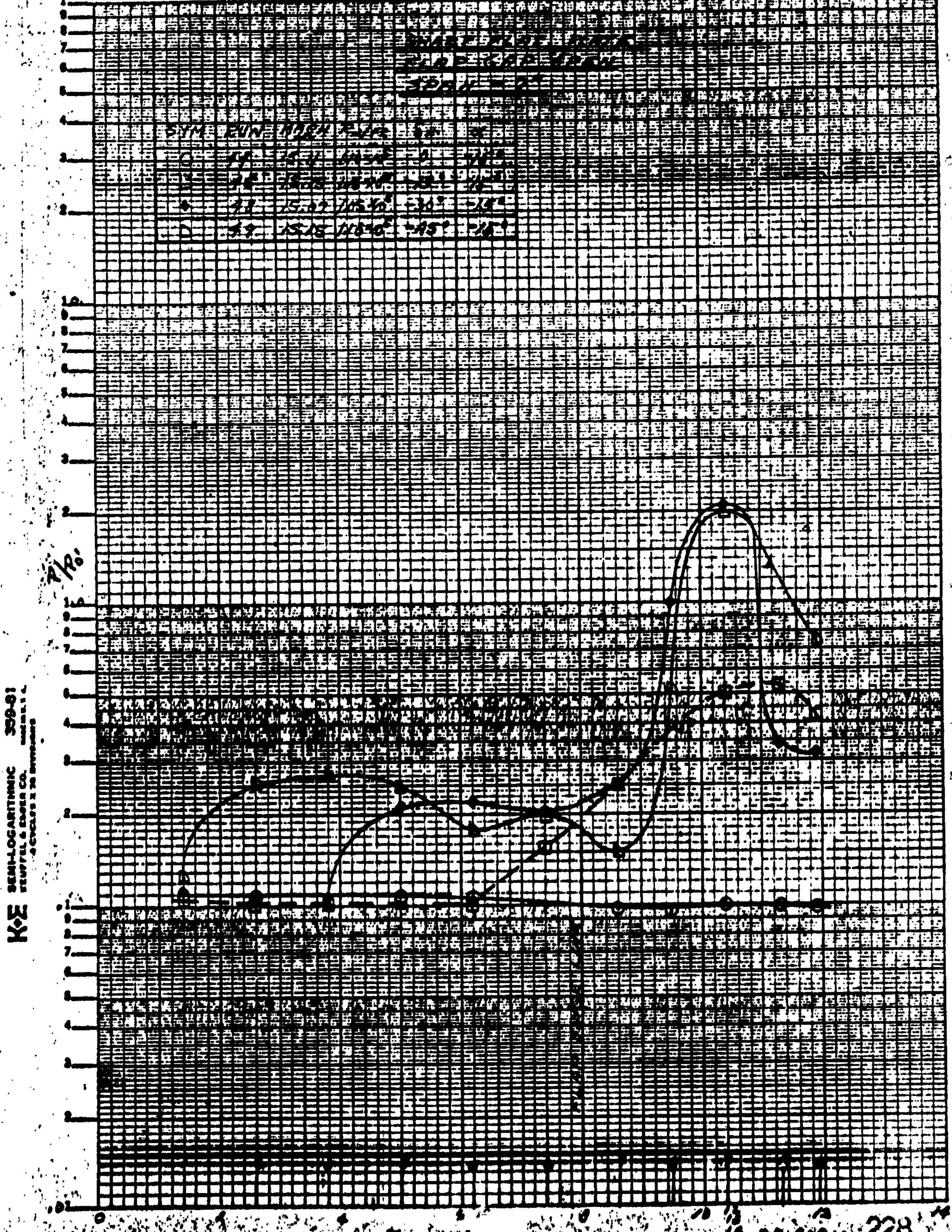


FIG. 26b

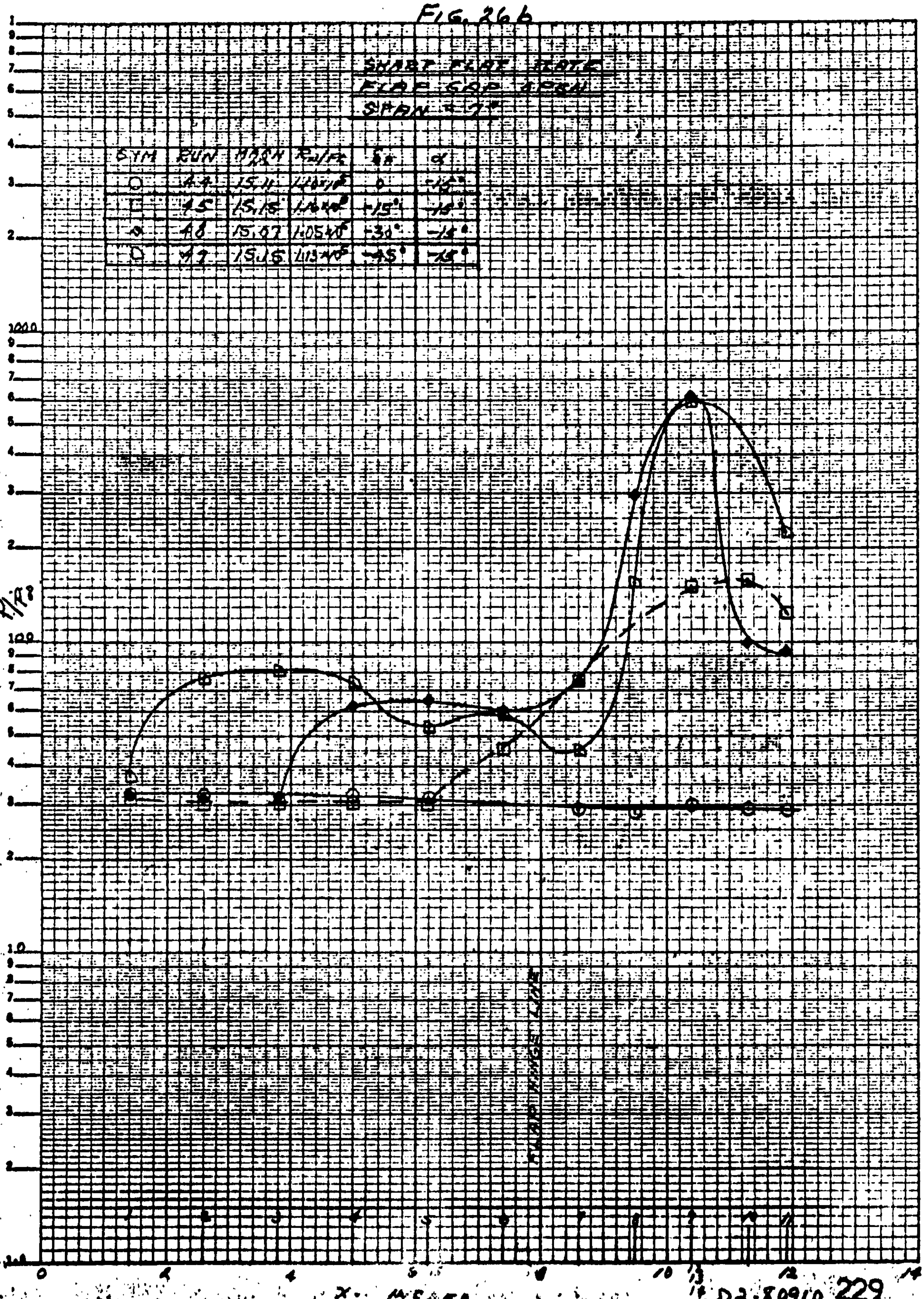
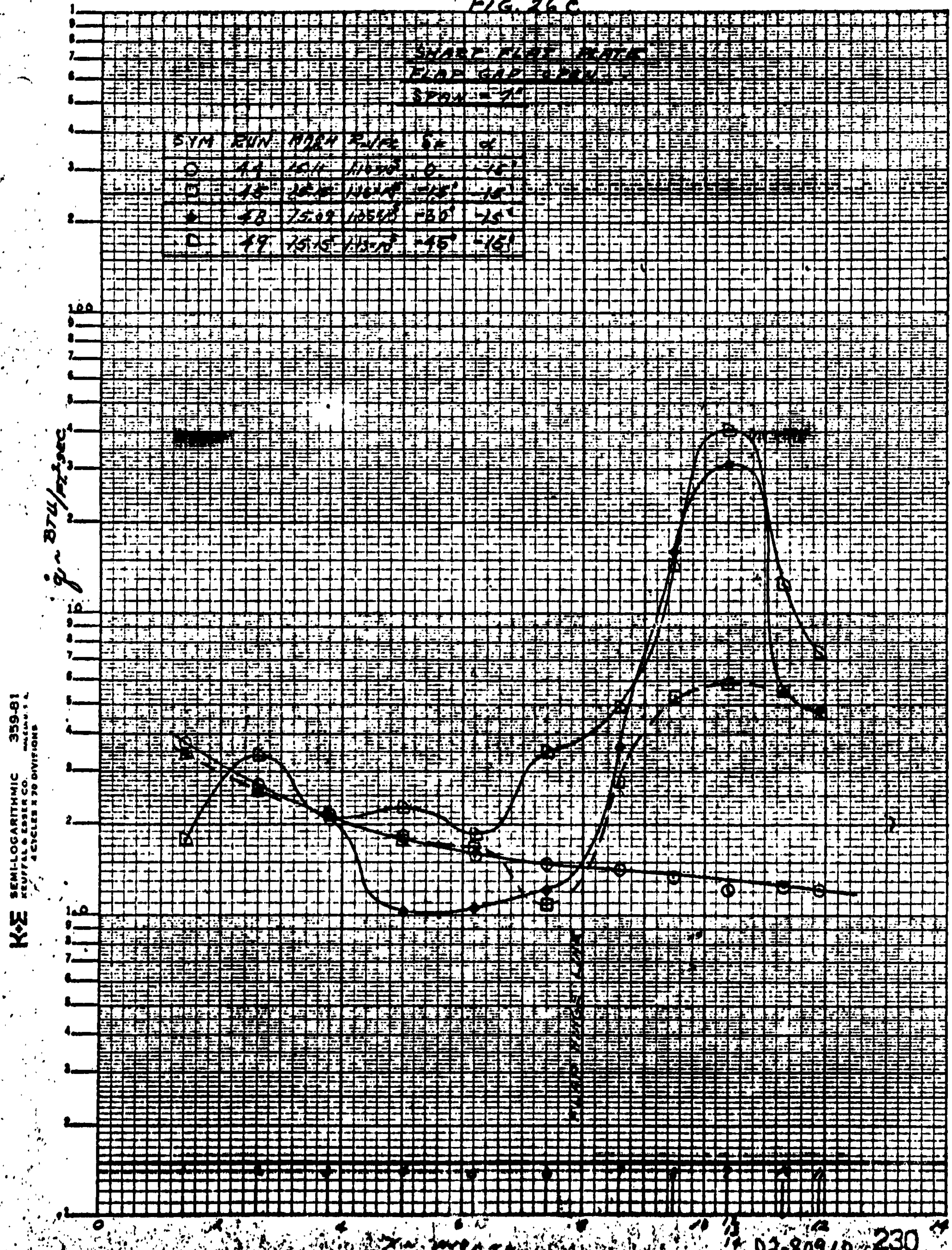


FIG. 26C


SYM
RUN
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

EFFECT OF FLAP DEFLECTIONS ON THE PRESSURE AND HEAT TRANSFER DISTRIBUTION ON A SHARP FLAT PLATE

$\alpha = +15^{\circ}$

$M = 6.37$

$R_N/ft. = 14 \times 10^6$

FIGURE 27

FIG. 27a

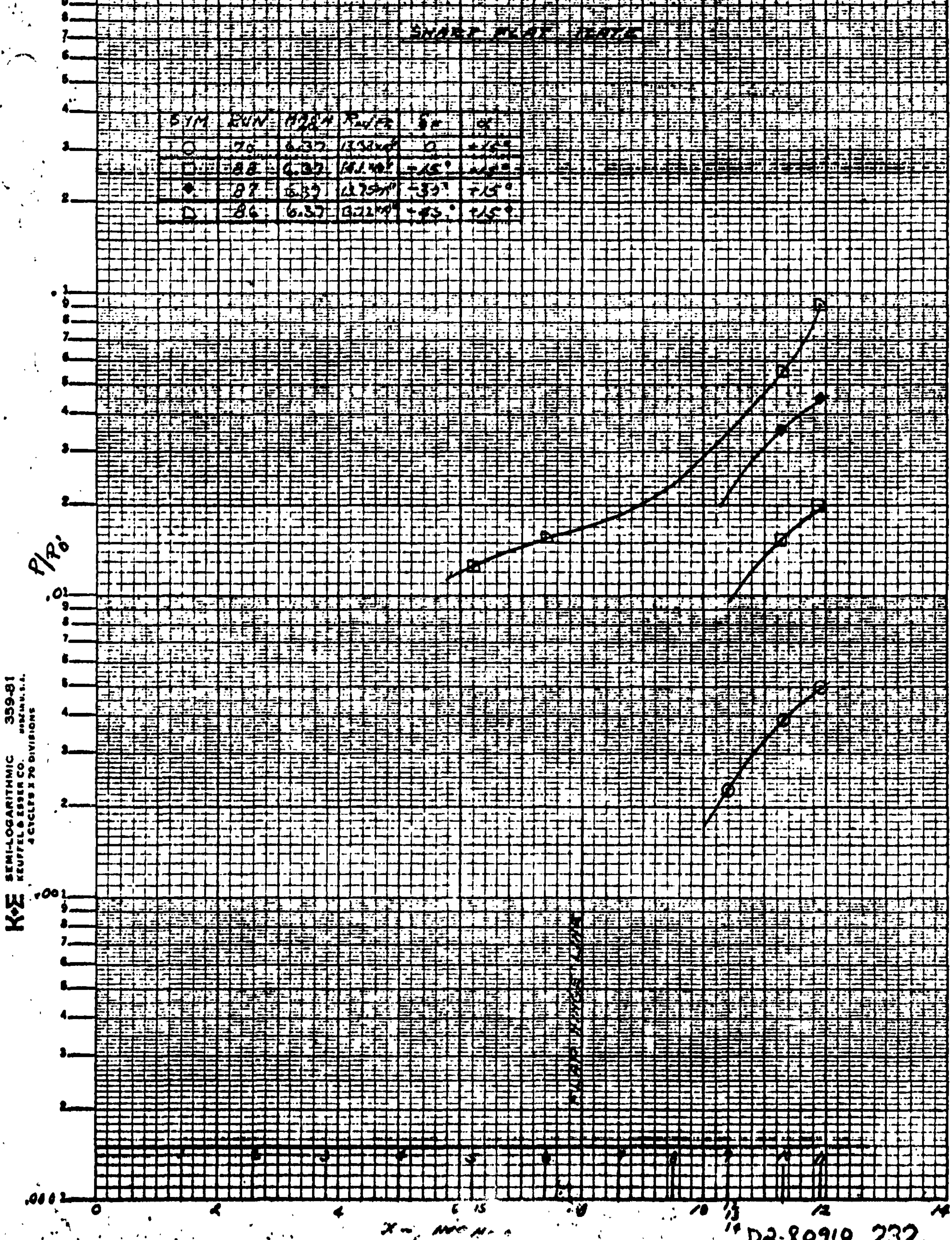
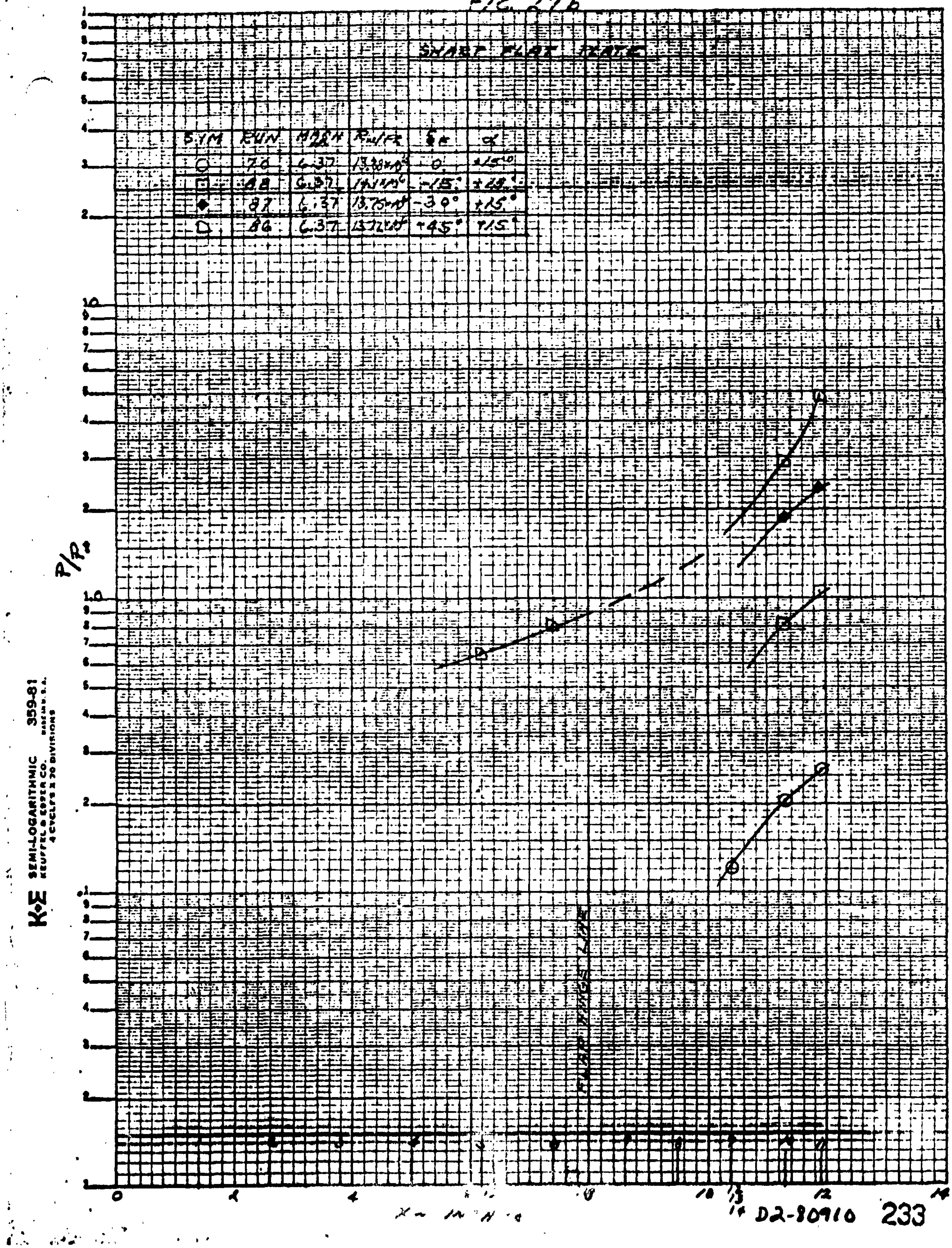

SYM RUN
76 6.37 0
88 6.37 +15°
87 6.37 -35° +15°
86 6.37 +45° +15°
P/P0'
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 27b


SYM
RUN
MACH
70
88
87
86
6.37
0°
-15°
-30°
+45°
+15°
P/P∞
FLAP HINGE LINE
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO. MADE IN U.S.A.
4 CYCLES X 70 DIVISIONS

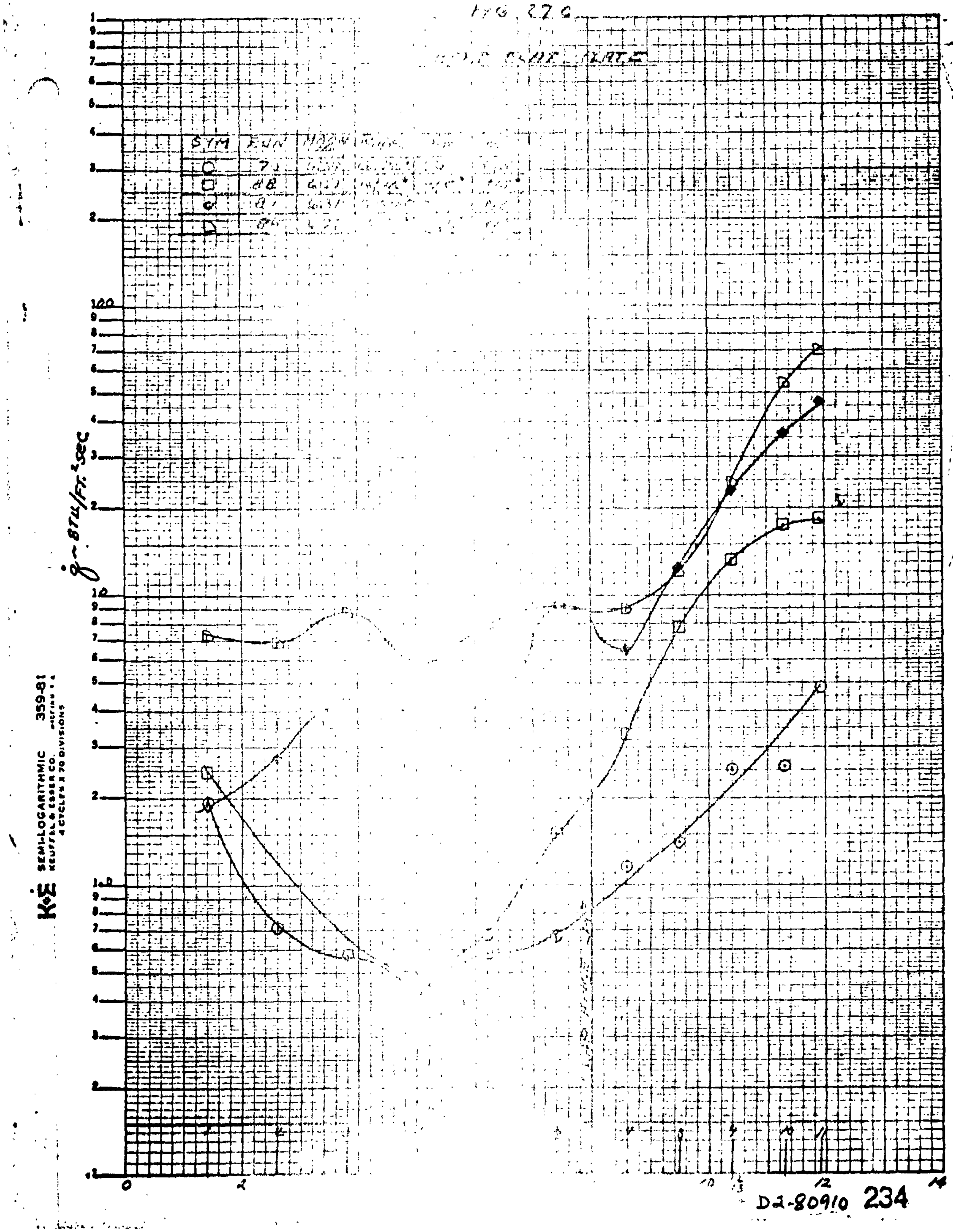
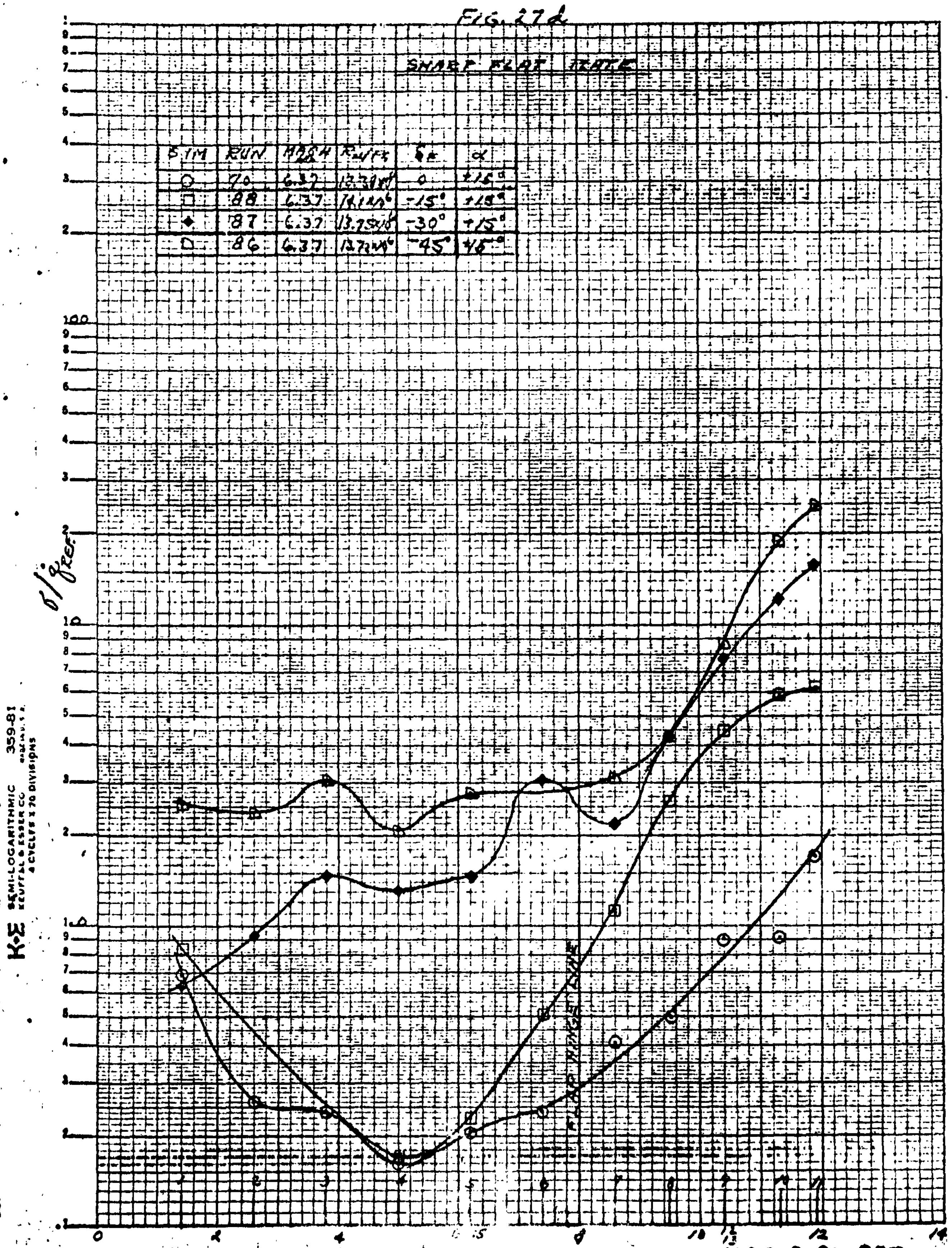


FIG. 27 C
SYM RUN
$\dot{q}$ ~ BTU/FT.^{2} SEC
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 27d



SHARP FLAT PLATE
SYM RUN MACH R/FT δ α
70 6.37 0 +15°
88 6.37 -15° +15°
87 6.37 -30° +15°
86 6.37 -45° +15°
σ/q REF
FLAP HINGE LINE
0 2 4 6 8 10 12 14

EFFECT OF FLAP DEFLECTIONS ON THE PRESSURE AND HEAT TRANSFER DISTRIBUTION ON A SHARP FLAT PLATE

$\alpha = +15^{0}$

$M_{\infty} = 15.1$

$R_{N}/ft. = 1.1 \times 10^{5}$

FIGURE 28

DA-80910
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FIG. 28a

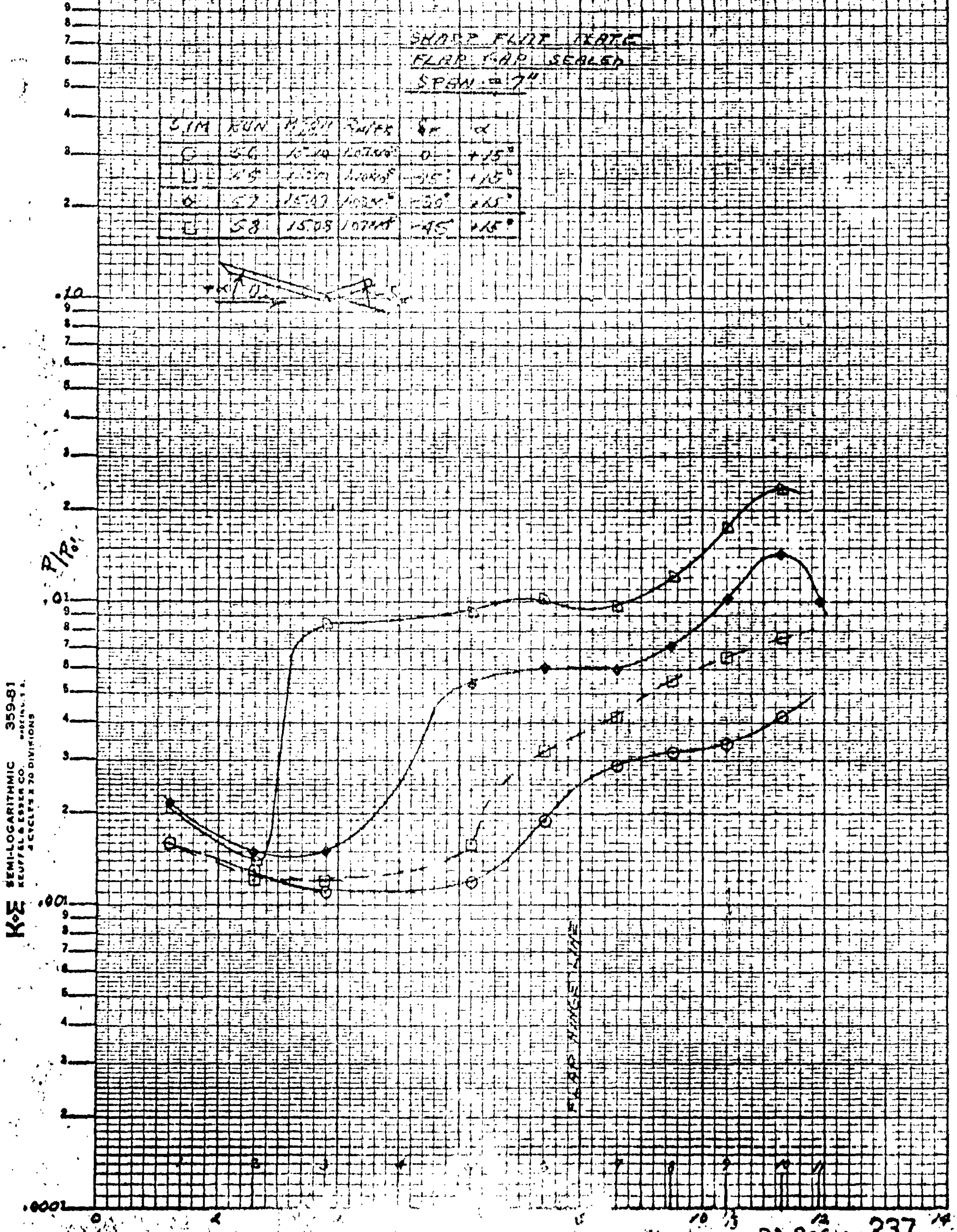


FIG. 28 b

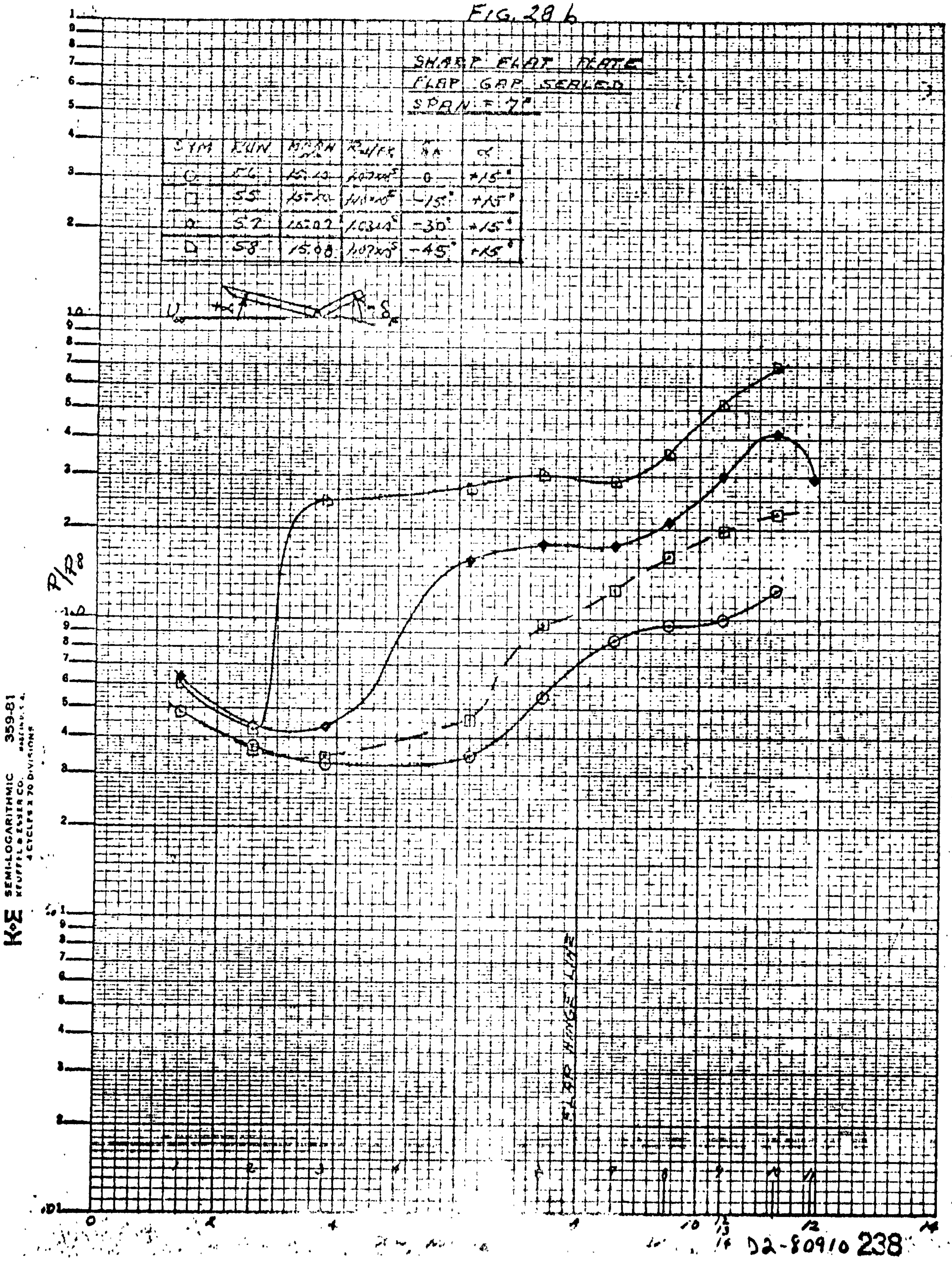

SHARP FLAT PLATE
FLAP GAP SEALED
SPAN = 7"
SYM RUN MACH R_N/FT δ_R α
○ 56 15.10 1.07×10^5 0 +15°
□ 55 15.10 1.11×10^5 -15° +15°
◇ 57 15.02 1.03×10^5 -30° +15°
△ 58 15.08 1.07×10^5 -45° +15°
U_∞
$+\alpha$
$-\delta_R$
P/P∞
FLAP HINGE LINE
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 28c

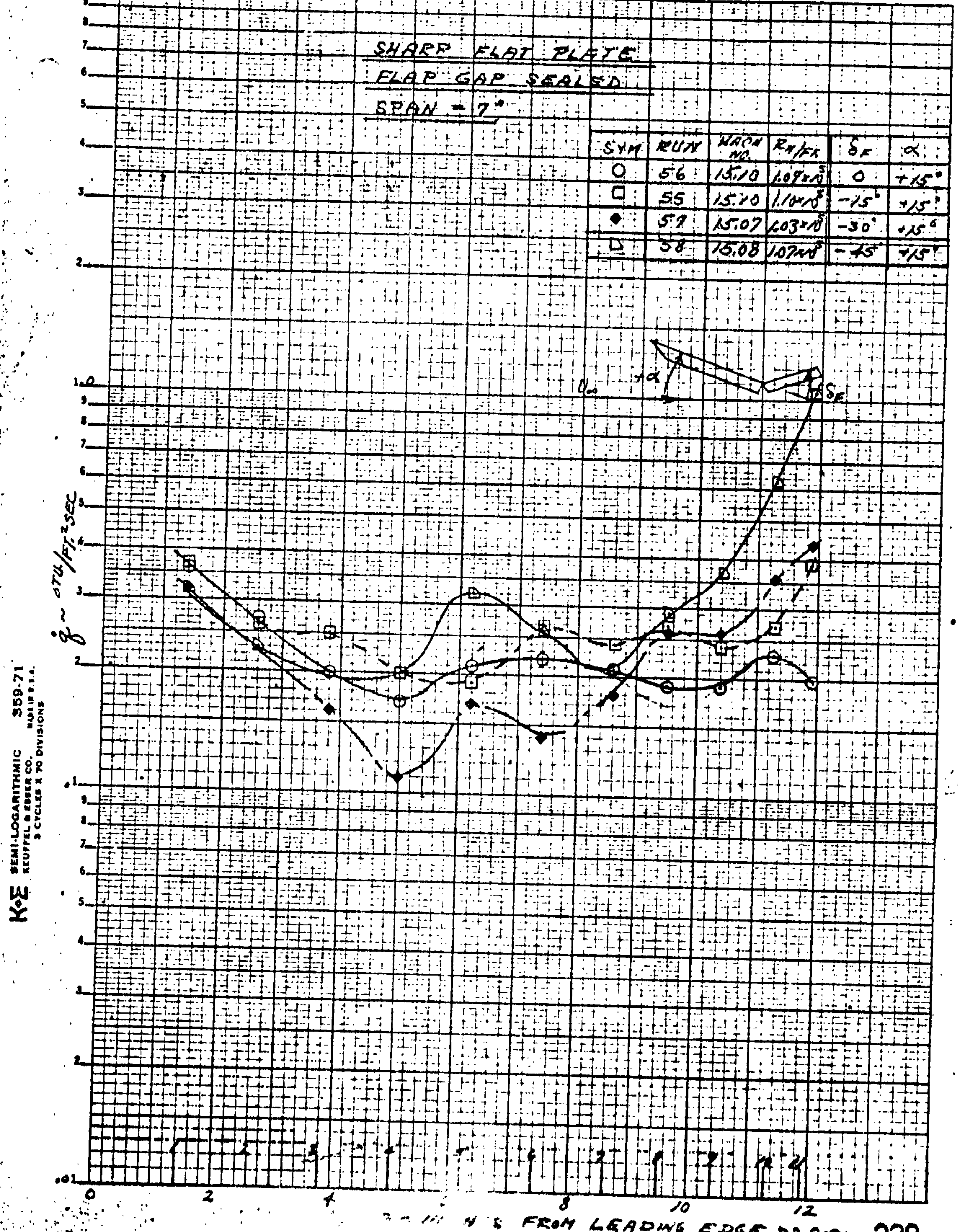
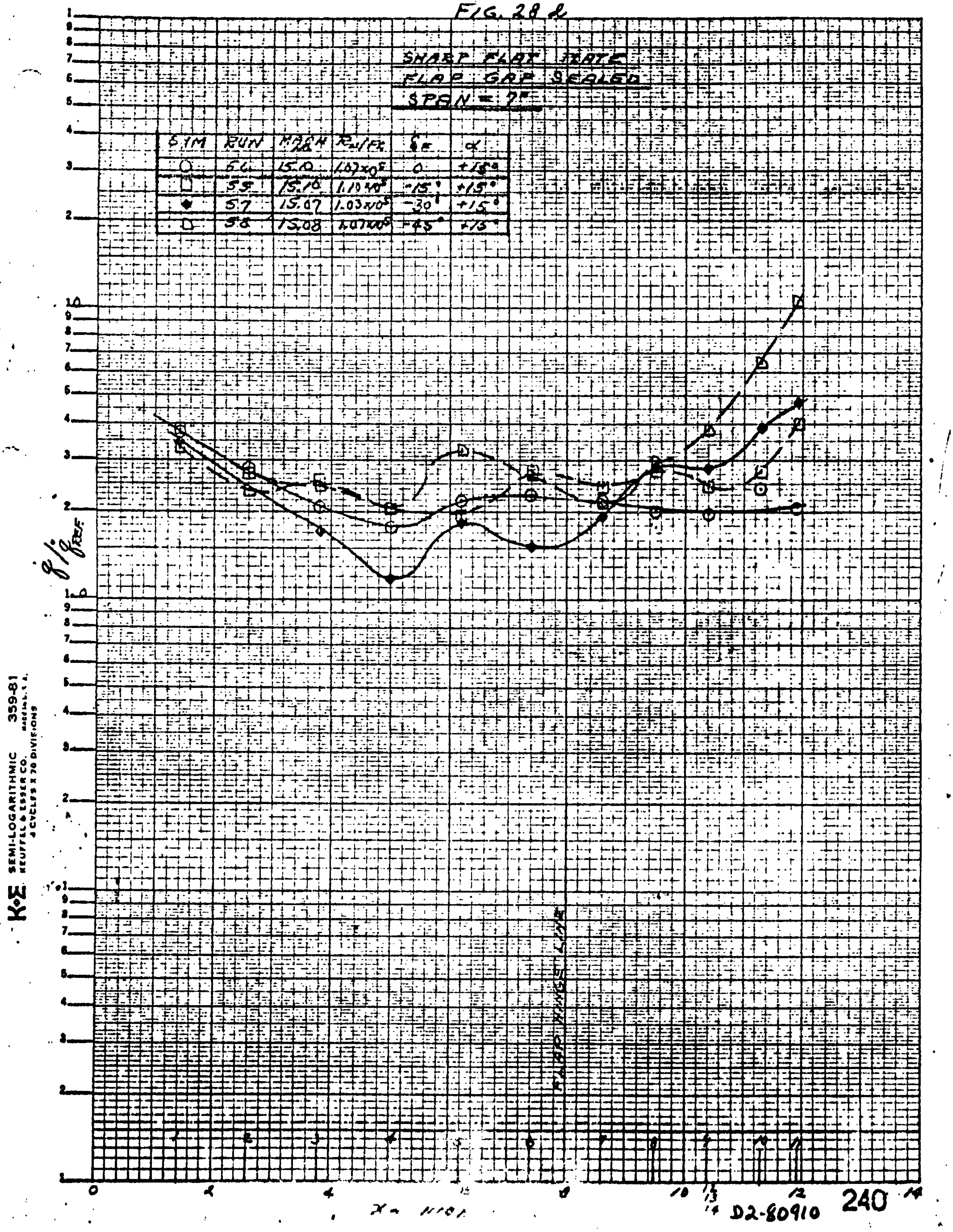

SHARP FLAT PLATE
FLAP GAP SEALED
SPAN = 7"
SYM | RUN | MACH NO. | RN/FT | δF | α
○ | 56 | 15.10 | 1.07×10^5 | 0 | +15°
□ | 55 | 15.10 | 1.10×10^5 | -15° | +15°
◆ | 57 | 15.07 | 1.03×10^5 | -30° | +15°
⊐ | 58 | 15.08 | 1.07×10^5 | -45° | +15°
U∞
+α
δF
q̇ ~ BTU/FT.² SEC
FROM LEADING EDGE
K+E SEMI-LOGARITHMIC 359-71
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

FIG. 28 d


SHARP FLAT PLATE
FLAP GAP SEALED
SPAN = 7"
SIM RUN MACH RN/FT δF α
○ 56 15.0 1.07x10^5 0 +15°
□ 55 15.10 1.10x10^5 -15° +15°
◆ 57 15.07 1.03x10^5 -30° +15°
D 58 15.08 1.07x10^5 -45° +15°
q/qREF
FLAP HINGE LINE
X ~ INCH
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

EFFECT OF SPAN VARIATION ON THE PRESSURE AND HEAT TRANSFER DISTRIBUTIONS OVER A SHARP FLAT PLATE

$\alpha = 0$

$\delta_F = -45^{\circ}$

$M_{\infty} = 6.37$

$R_N/ft. = 1.38 \times 10^6$

FIGURE 29

FIG. 29a

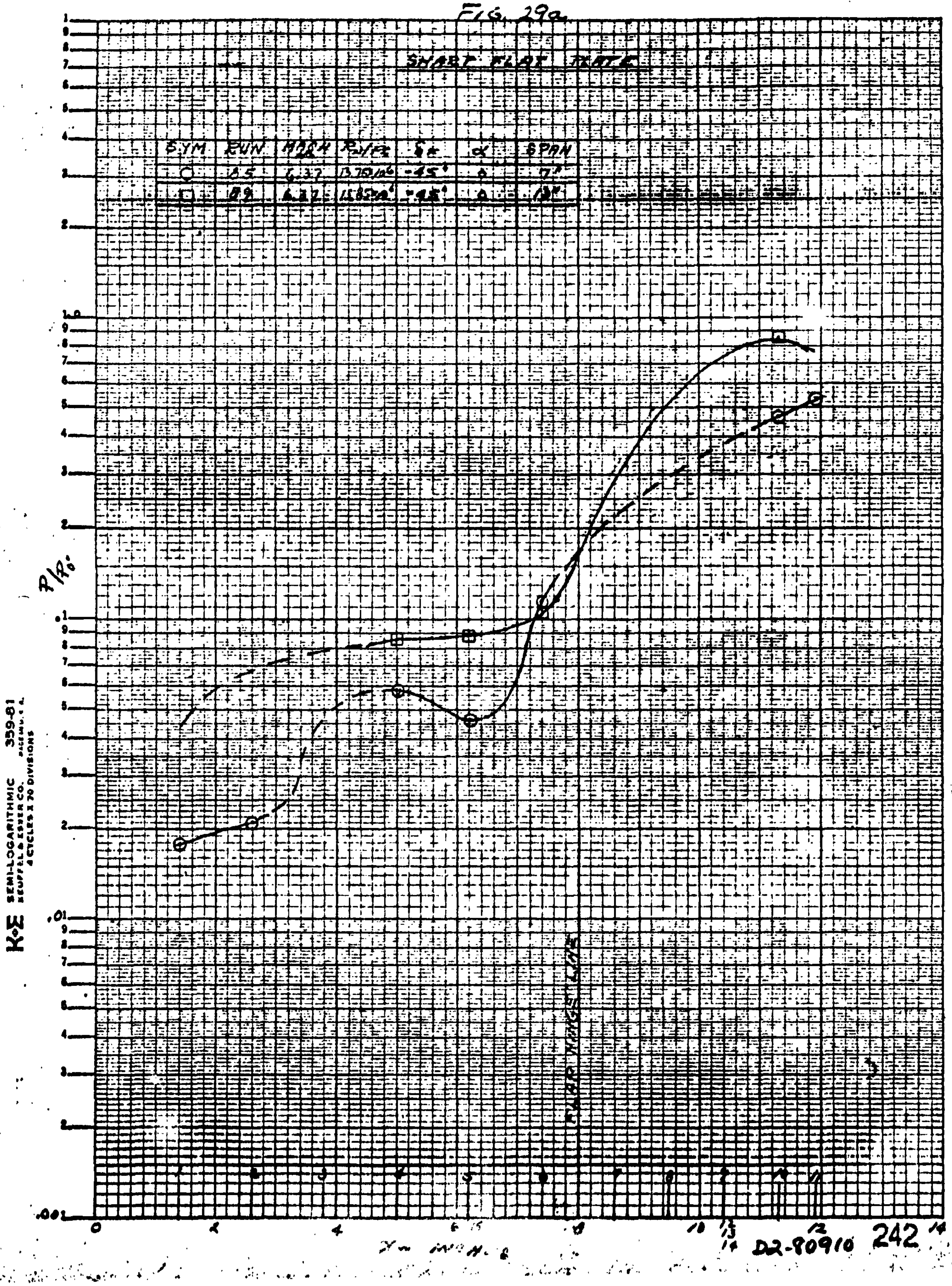

SYM RUN MACH
SPAN
85 6.37 -45° 0 7"
89 13"
FLAP HINGE LINE
X ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 296

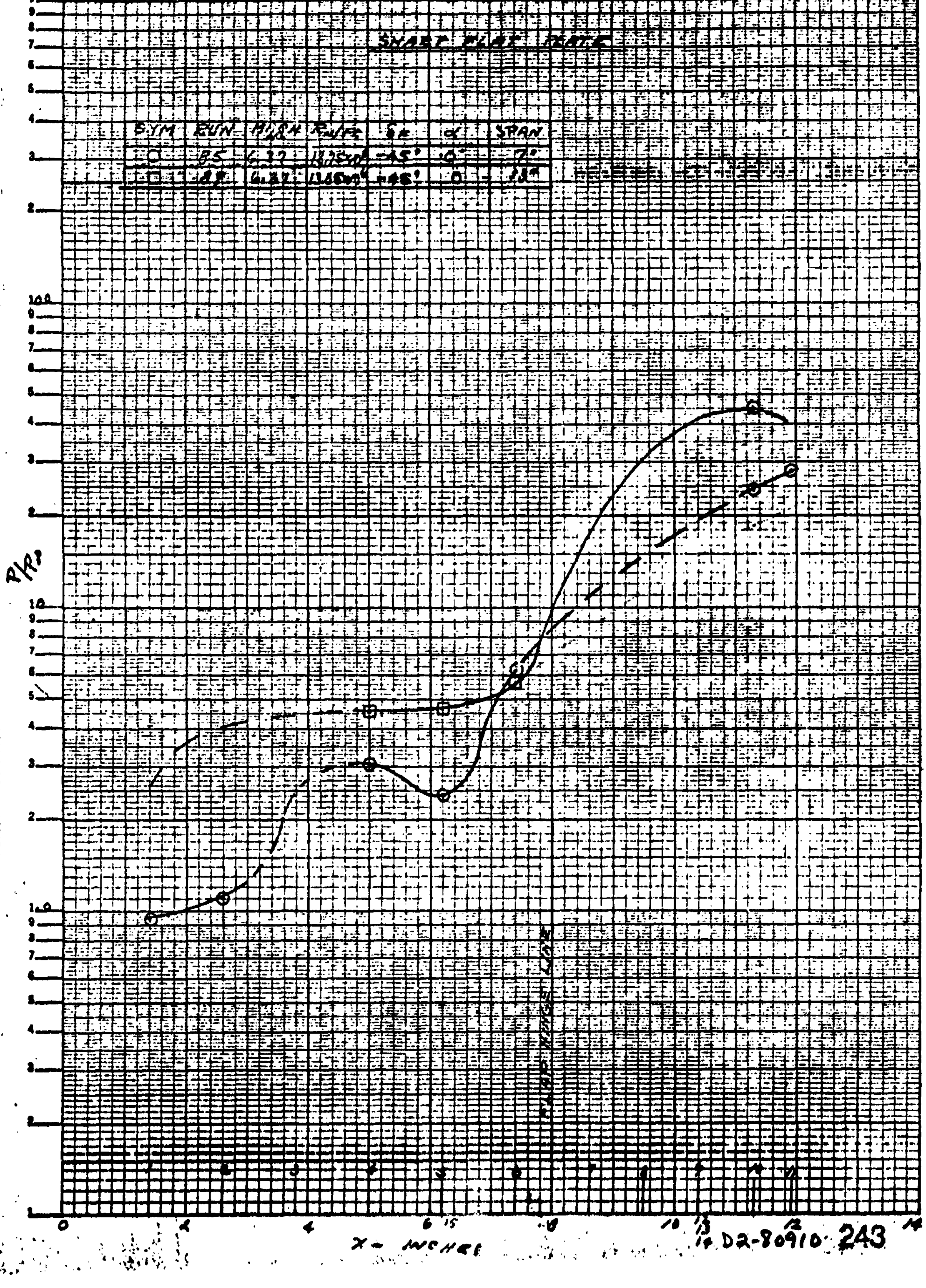
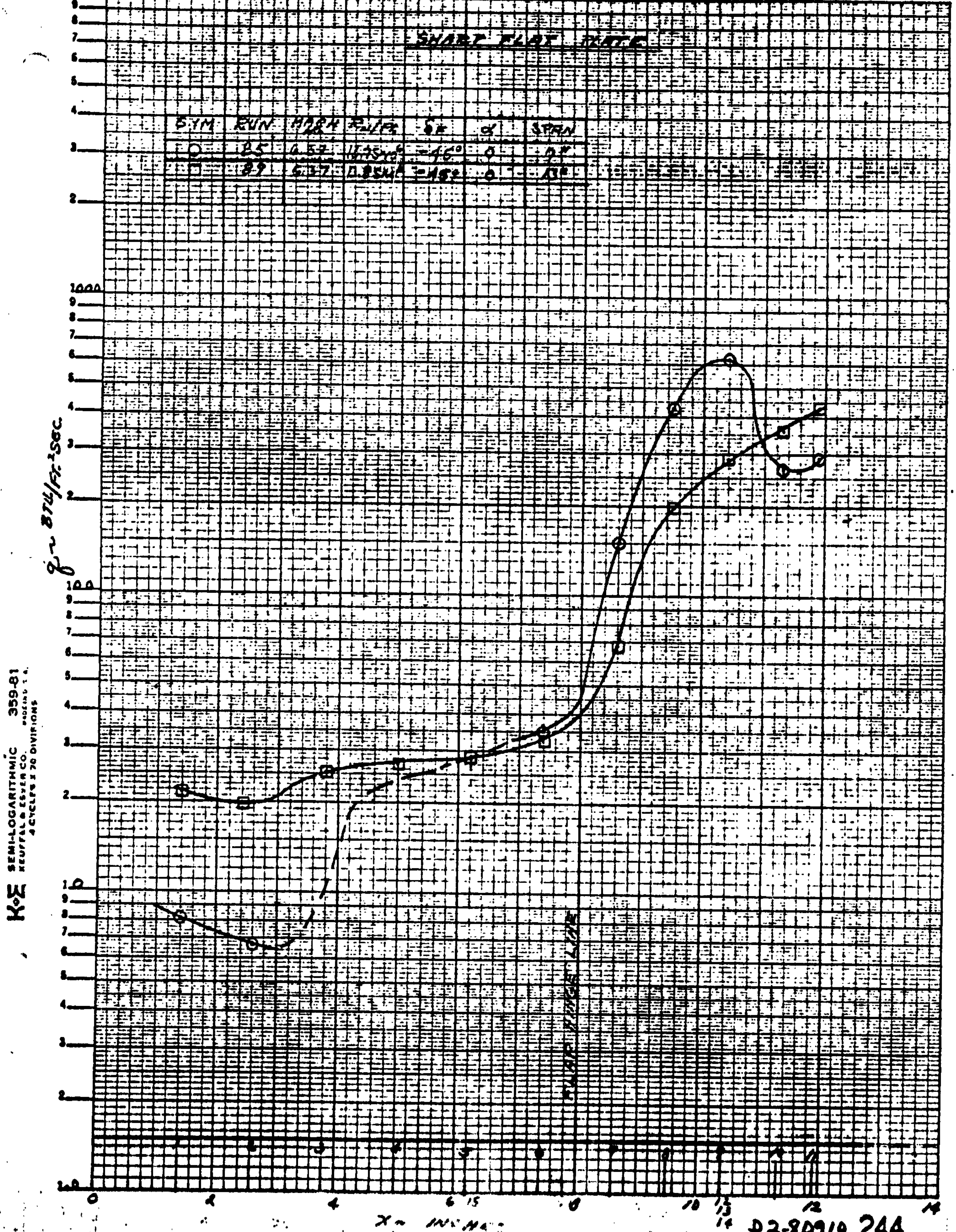
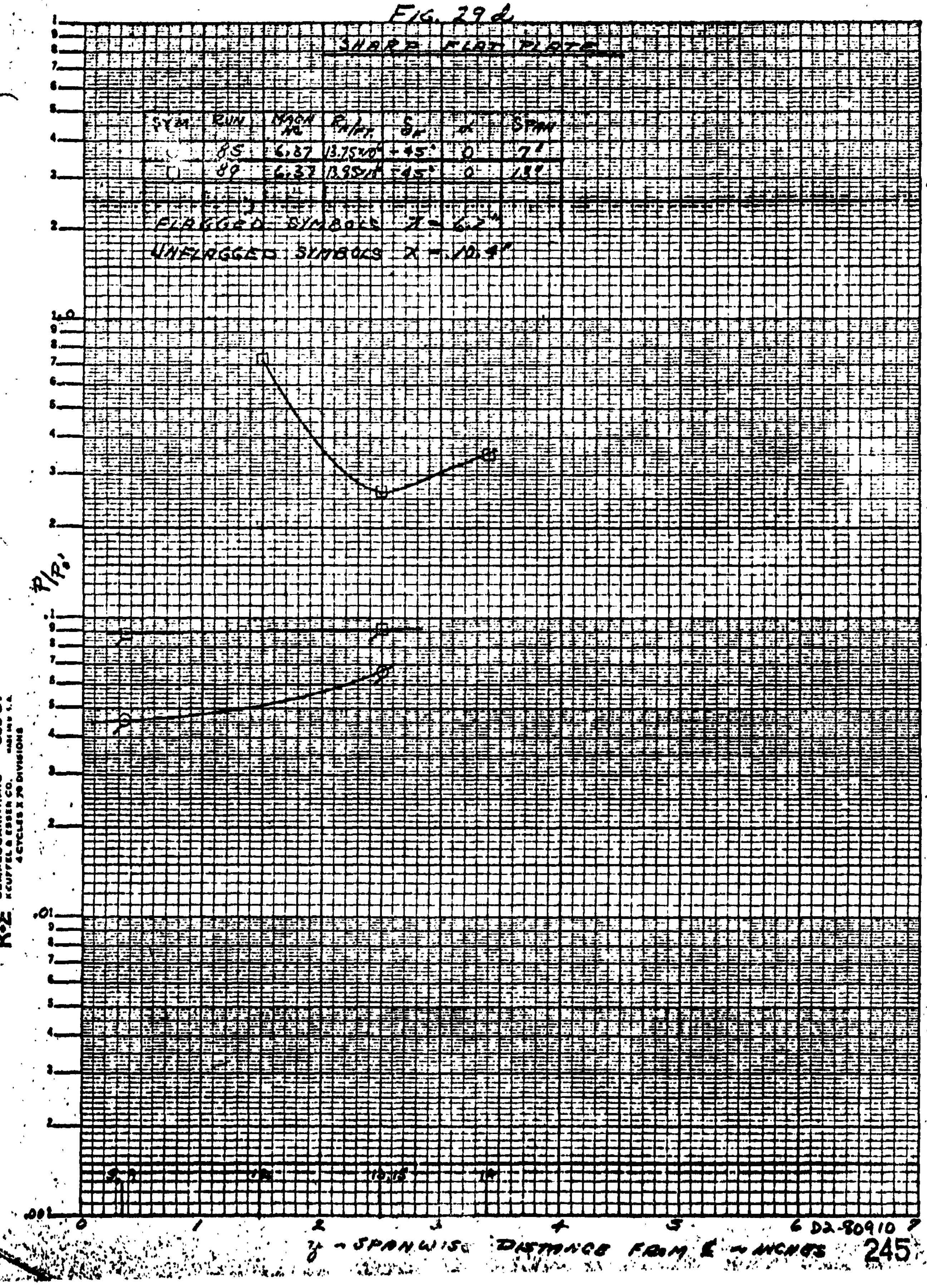


FIG 29C



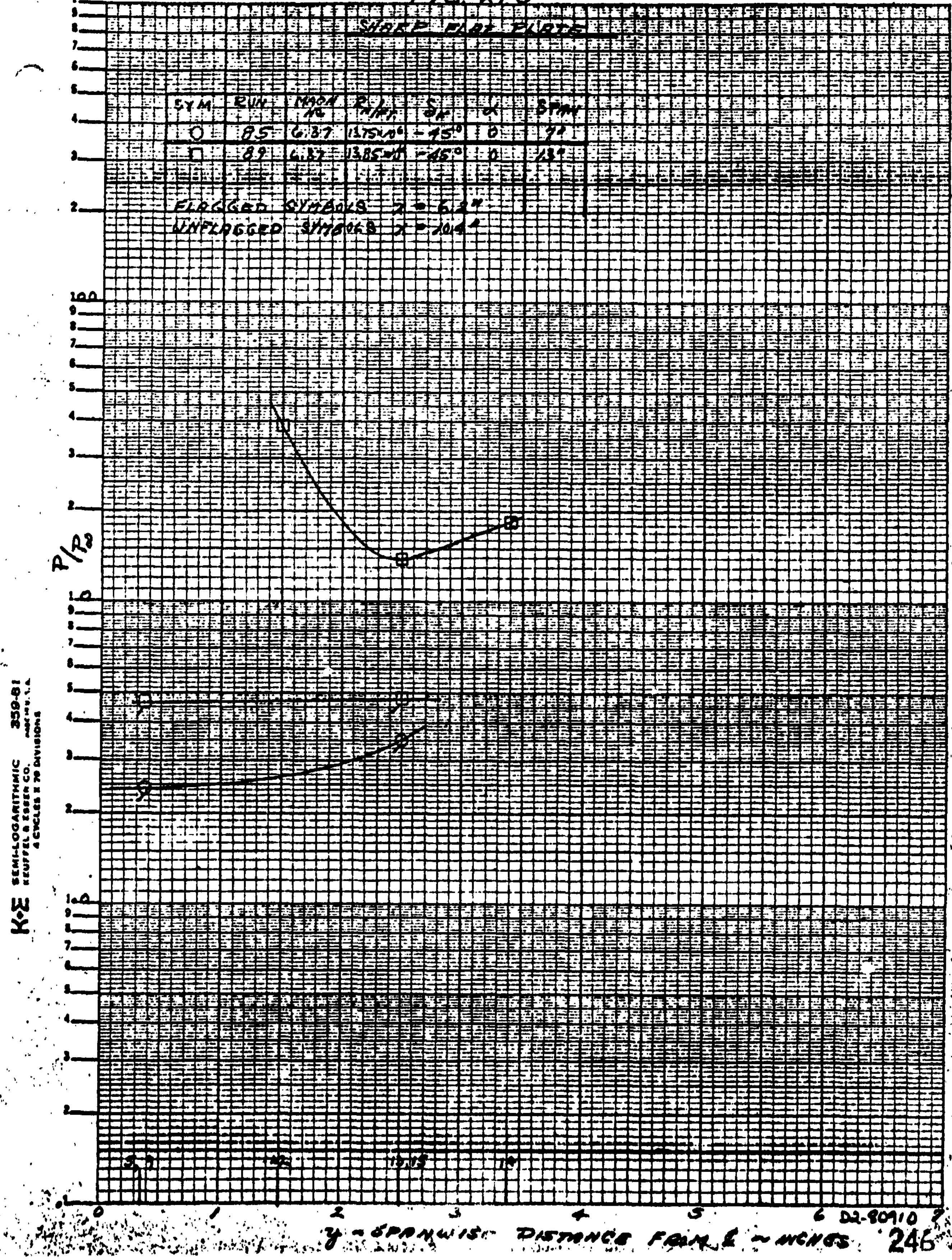
SHARP FLAT PLATE
SYM RUN MACH R_N/FT δ_F α SPAN
○ 85 6.57 $-15°$ 0
□ 89 6.57 $-15°$ 0
q ~ BTU/FT²-SEC
X ~ INCHES
FLAP HINGE LINE
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 29d



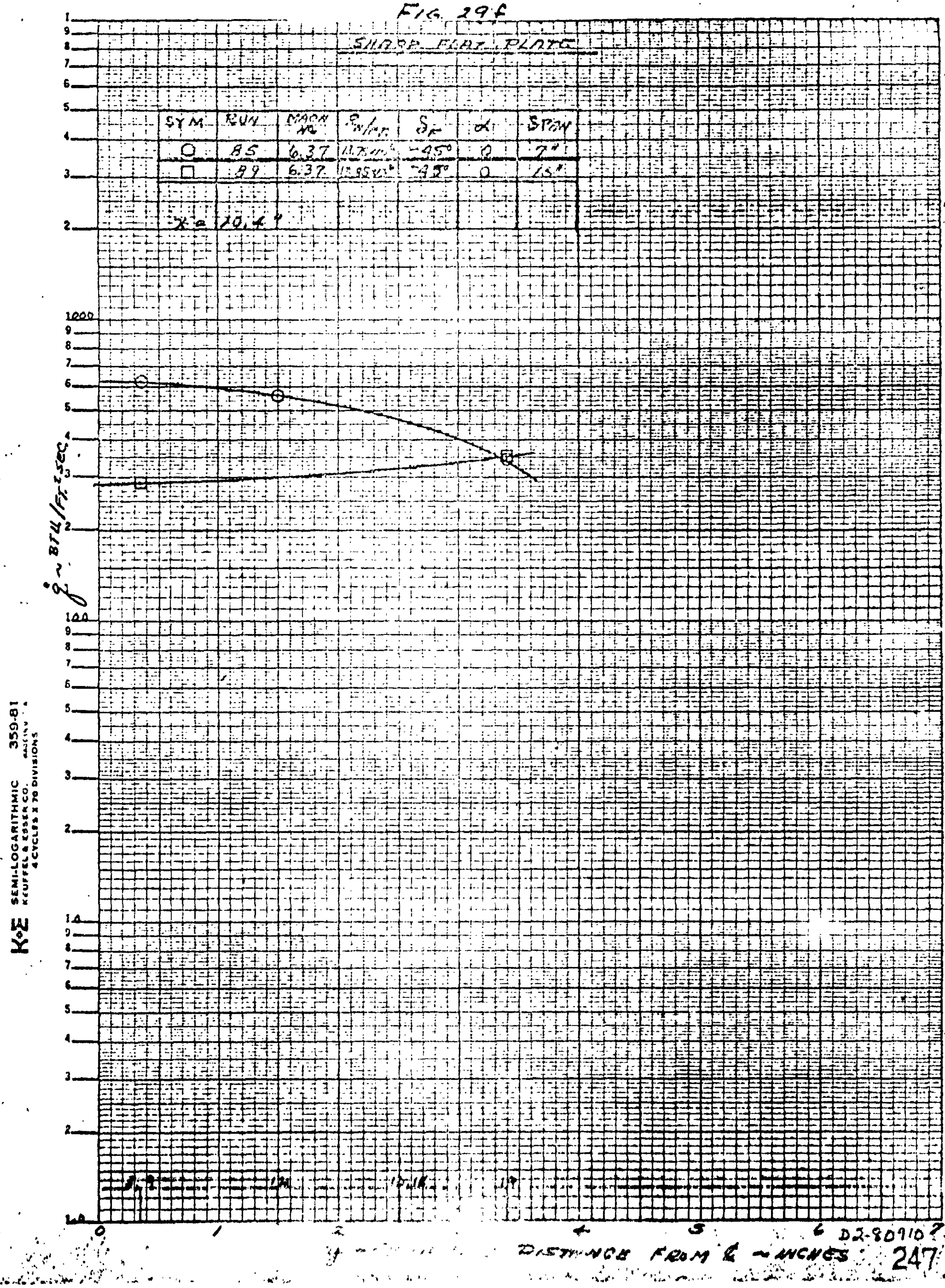
SHARP FLAT PLATE
SYM RUN MACH NO. RN/FT. δ_F α SPAN
○ 85 6.37 13.75x10⁶ +45° 0 7"
□ 89 6.37 13.95x10⁶ +45° 0 13"
FLAGGED SYMBOLS X = 6.2"
UNFLAGGED SYMBOLS X = 10.4"
P/P₀'
0 1 2 3 4 5 6 7
y ~ SPANWISE DISTANCE FROM ℄ ~ INCHES
K·E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS
D2-80910

FIG. 29a



SHARP FLAT PLATE
SYM | RUN | MACH No | R/L /FT | δ_F | α | SPAN
○ | 85 | 6.37 | 13.75×10^6 | -45° | 0 | 9"
□ | 89 | 6.37 | 13.85×10^6 | -45° | 0 | 13"
FLAGGED SYMBOLS x = 6.53"
UNFLAGGED SYMBOLS x = 10.14"
P/P0
y – SPANWISE DISTANCE FROM ℄ ~ INCHES
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 29f


SHARP FLAT PLATE
SYM RUN MACH NO. δ_F α SPAN
○ 85 6.37 -45° 0 7"
□ 89 6.37 -45° 0 15"
$\dot{q}$ ~ BTU/FT.² SEC.
DISTANCE FROM ℄ ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

EFFECT OF SPAN VARIATION ON THE PRESSURE AND HEAT TRANSFER DISTRIBUTIONS OVER A SHARP FLAT PLATE

$\alpha = 0$

$\delta_F = -45^\circ$

$M_\infty = 15.1$

$R_N/ft. = 1.1 \times 10^6$

FIGURE 30

FIG. 30a

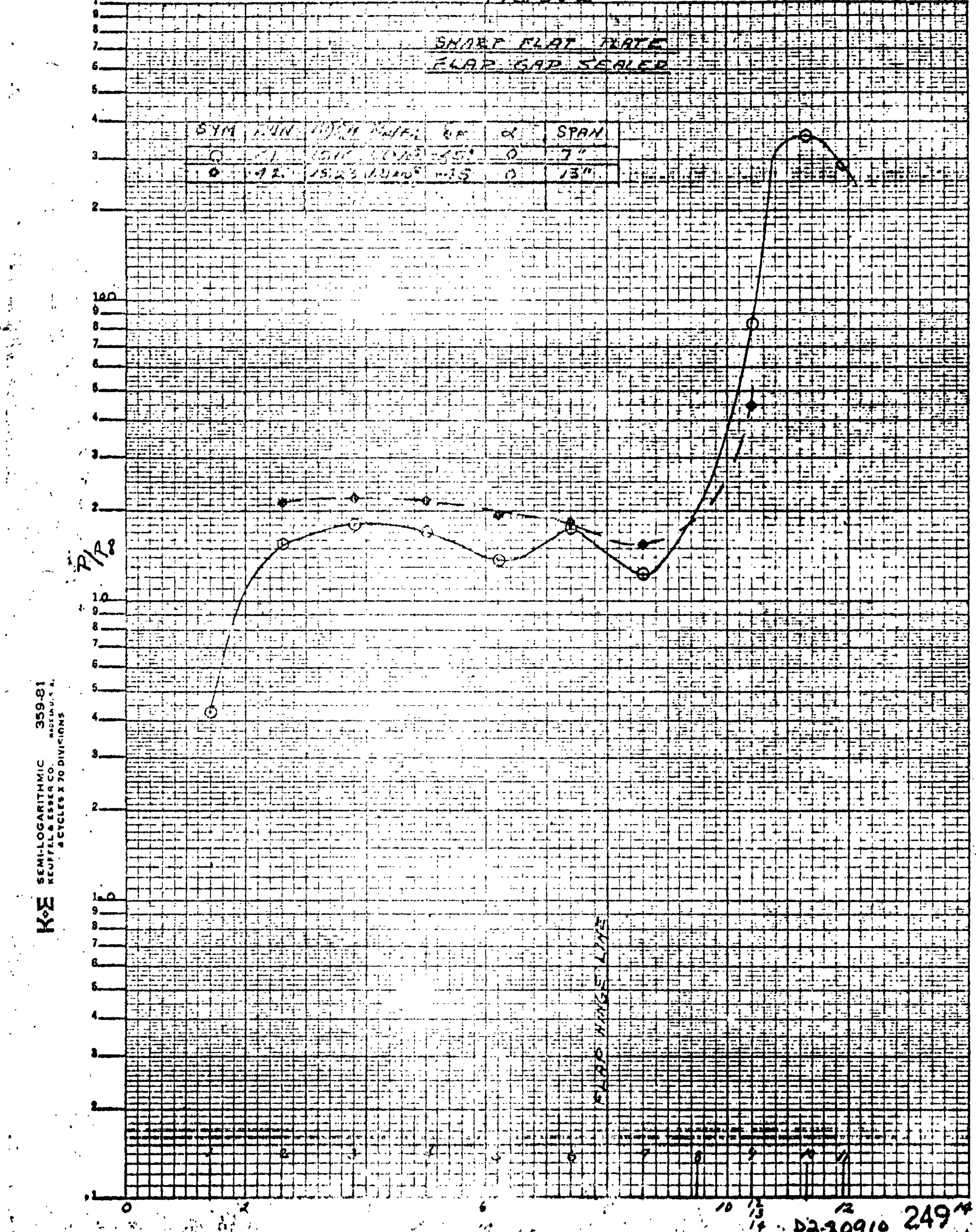
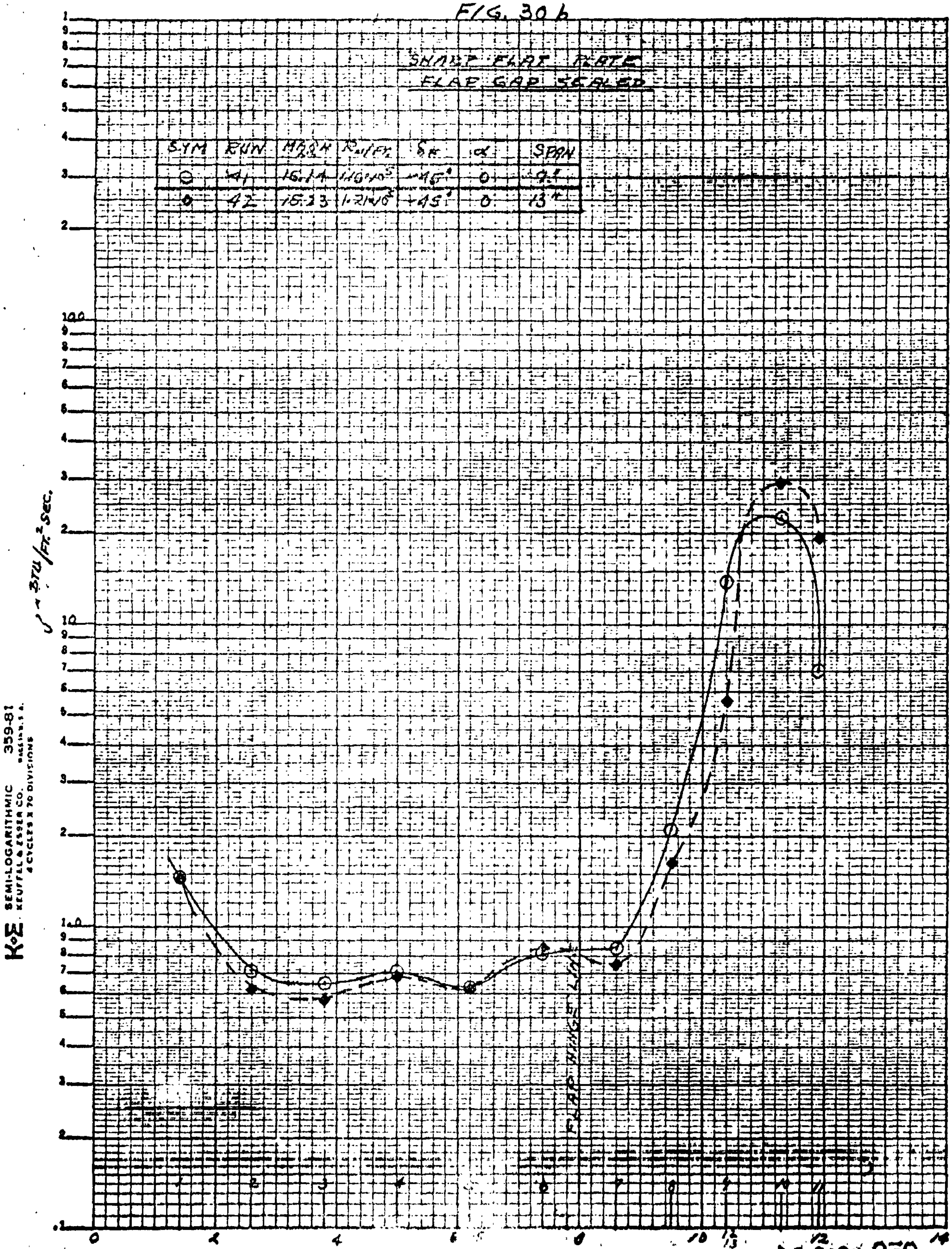
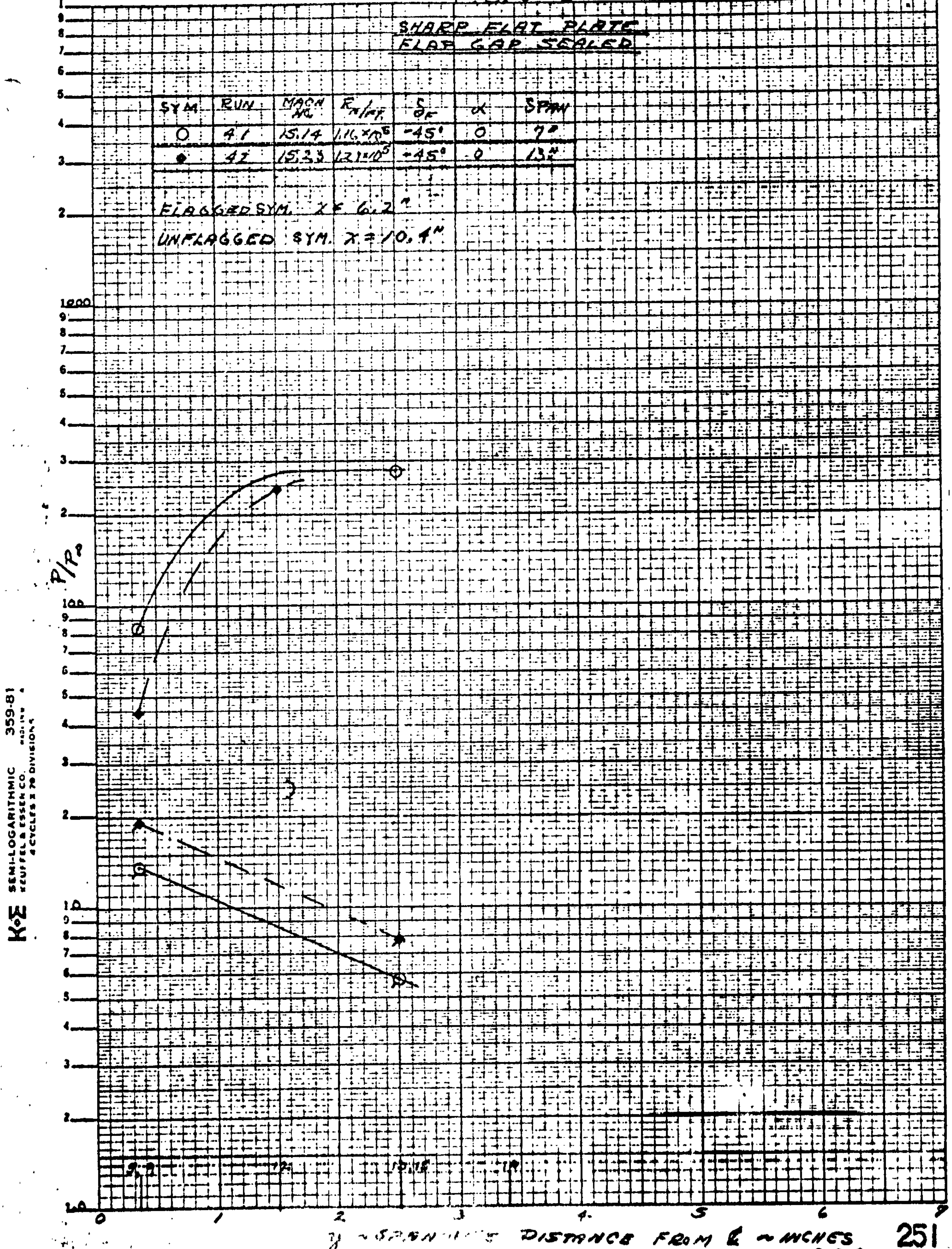

SHARP FLAT PLATE
FLAP GAP SEALED
SYM
SPAN
P/P8
FLAP HINGE LINE
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 30 b



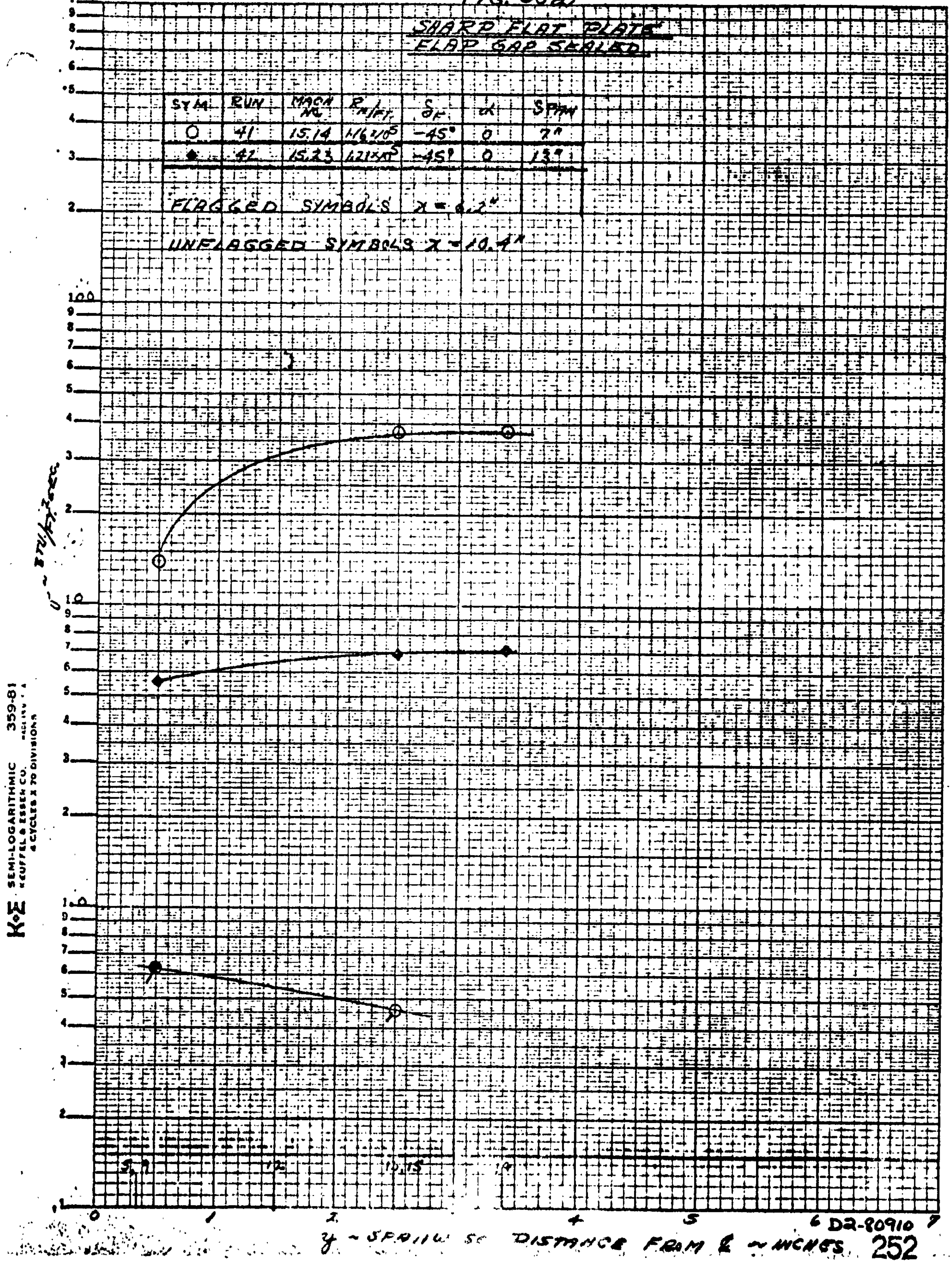
FLAP GAP SEALED
SYM RUN MACH SPAN
41 16.14 0
42 15.23 +45° 0 13"
BTU/FT.² SEC.
FLAP HINGE LINE
KE SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 30c



SHARP FLAT PLATE
FLAP GAP SEALED
SYM RUN MACH NO. R/FT. δF α SPAN
○ 41 15.14 1.16×10^5 -45° 0 7"
◆ 42 15.33 1.21×10^5 -45° 0 13"
FLAGGED SYM. X = 6.2"
UNFLAGGED SYM. X = 10.4"
P/P∞
y ~ SPANWISE DISTANCE FROM ℄ ~ INCHES
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 30d


SHARP FLAT PLATE
FLAP GAP SEALED
SYM RUN MACH NO. R_N/FT. δ_F α SPAN
○ 41 15.14 1.162×10^5 −45° 0 7"
◆ 42 15.23 1.21×10^5 −45° 0 13"
FLAGGED SYMBOLS x = 6.2"
UNFLAGGED SYMBOLS x = 10.4"
q ~ BTU/FT.² SEC.
y ~ SPANWISE DISTANCE FROM ℄ ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

EFFECTS OF SPAN VARIATION ON THE

PRESSURE AND HEAT TRANSFER DISTRIBUTIONS OVER

A SHARP FLAT PLATE

$\alpha = -15^\circ$

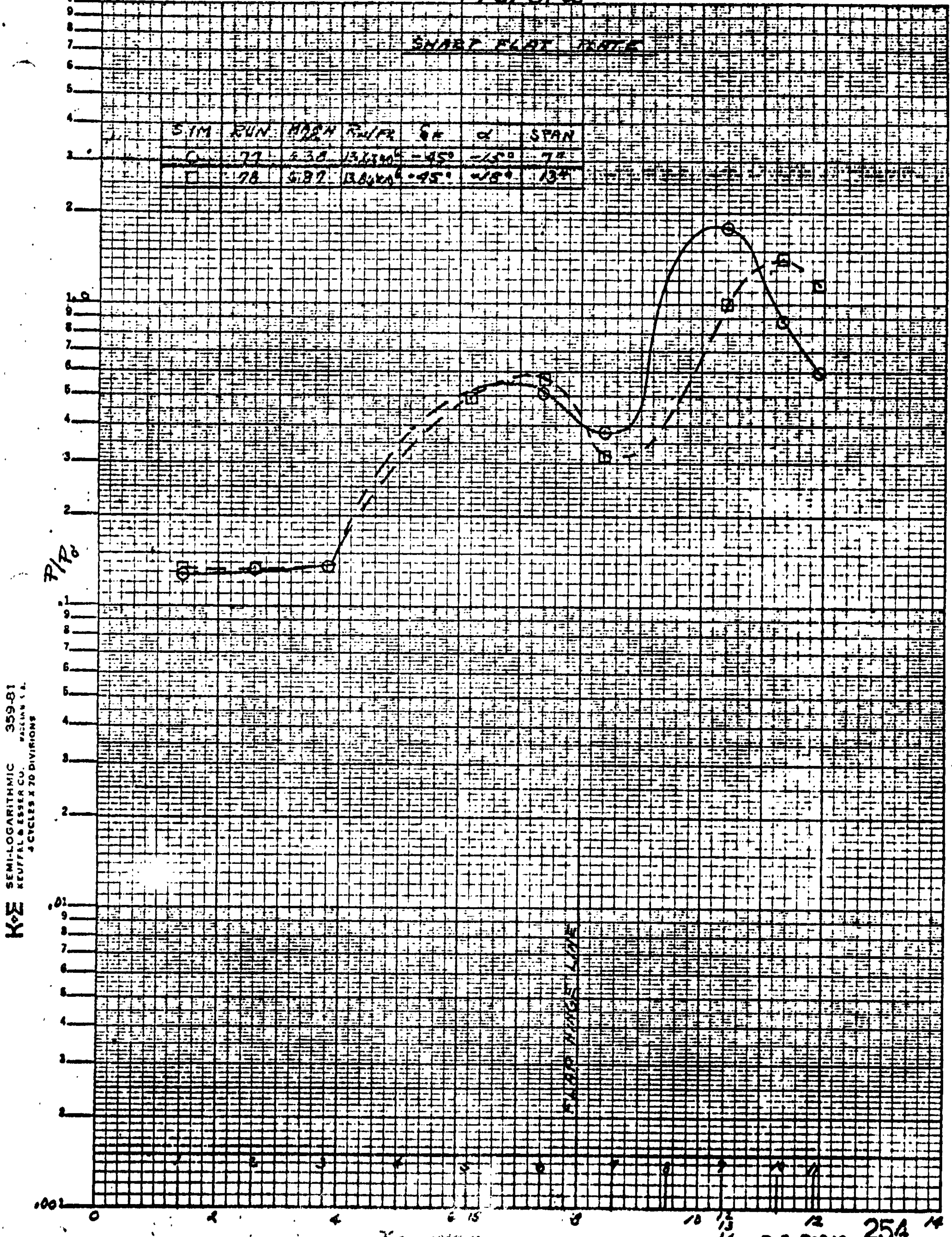
$\delta_F = -45^\circ$

$M_\infty = 6.38$

$R_N/ft. = 13.6 \times 10^6$

FIGURE 31

FIG. 31a



D2-80910

FIG. 31b

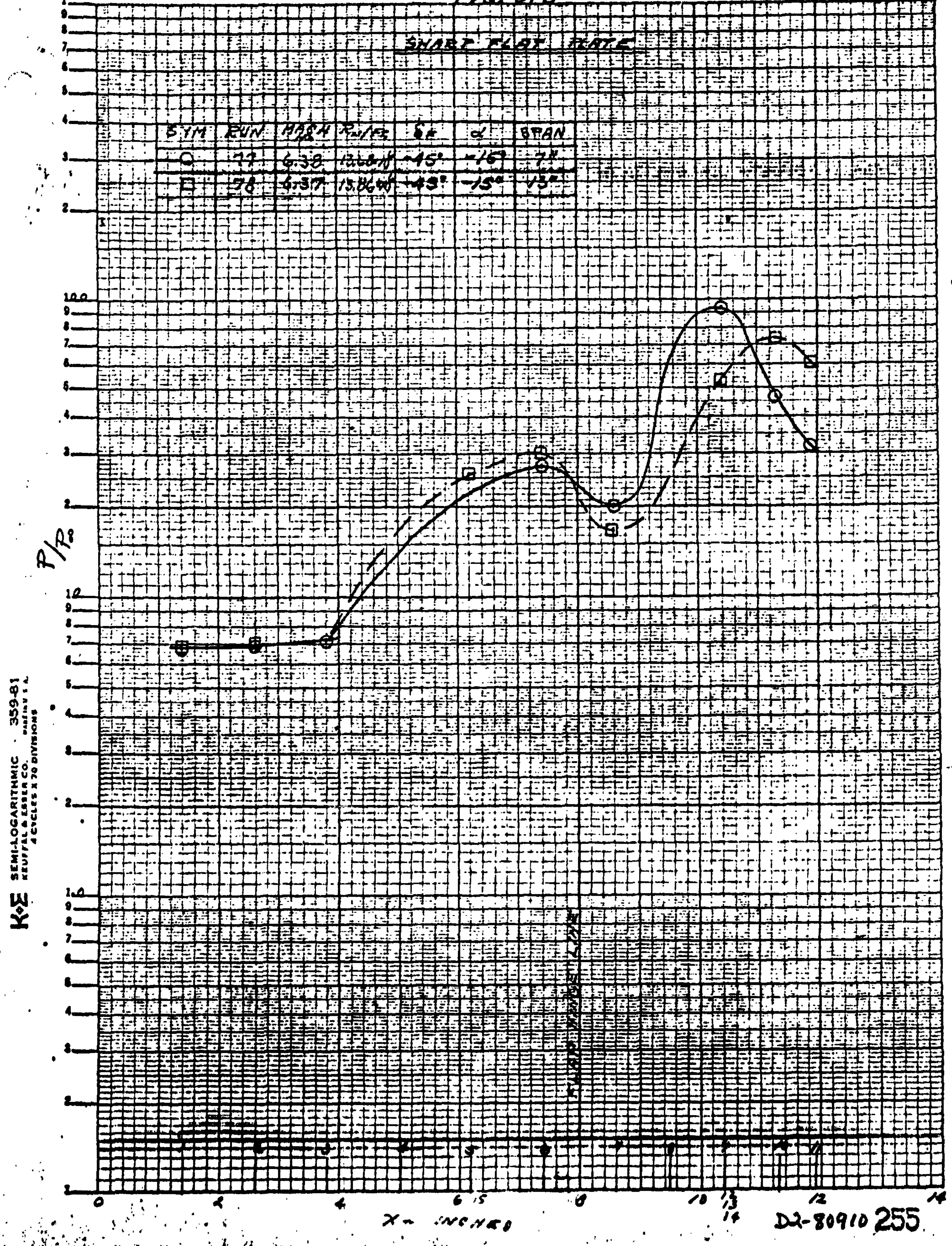

SHARP FLAT PLATE
SYM RUN MACH Rn/FT δF α SPAN
○ 77 6.38 13.68×10⁶ -45° -15° 7"
□ 78 6.37 13.86×10⁶ -45° -15° 13"
P/P∞
X ~ INCHES
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 31C

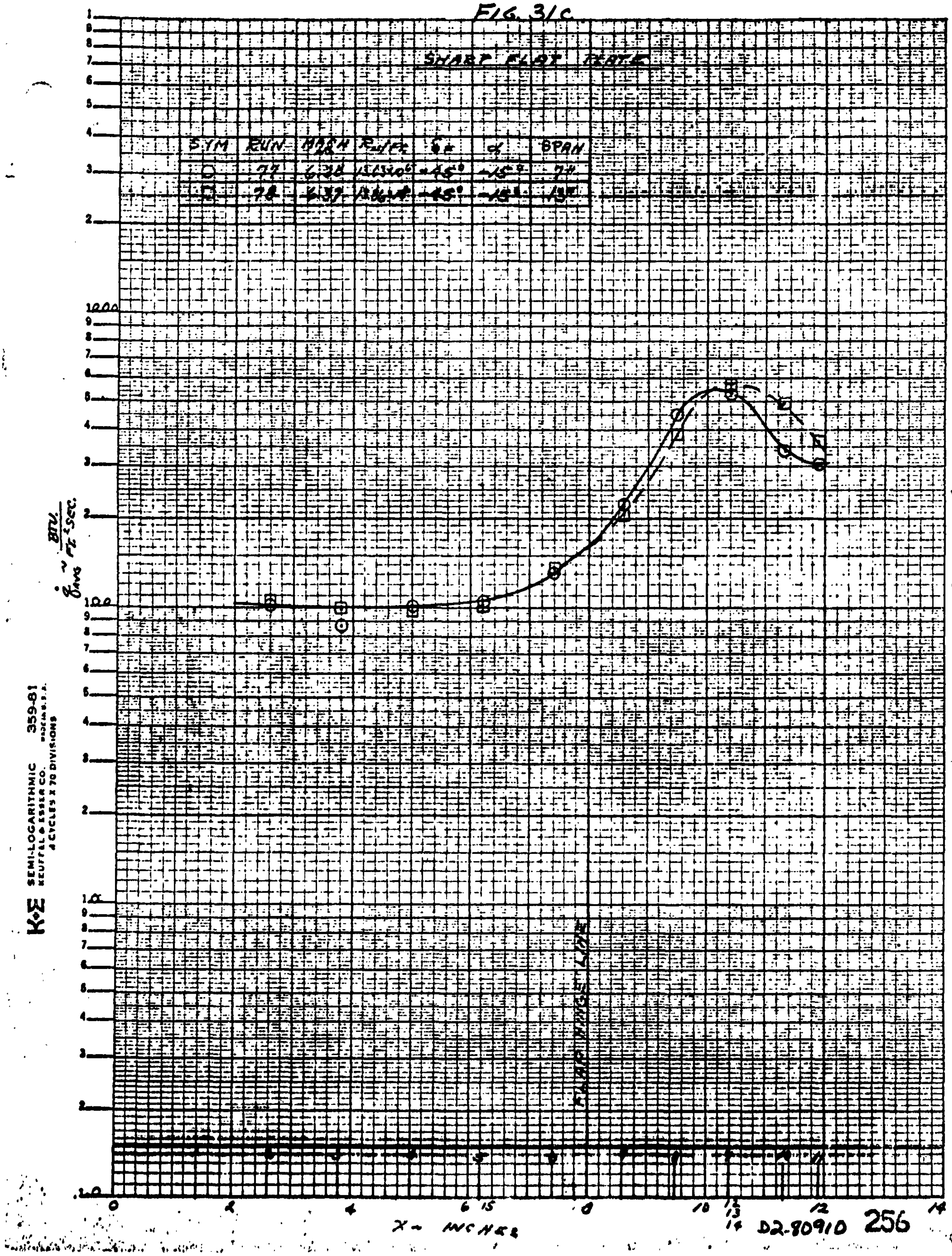
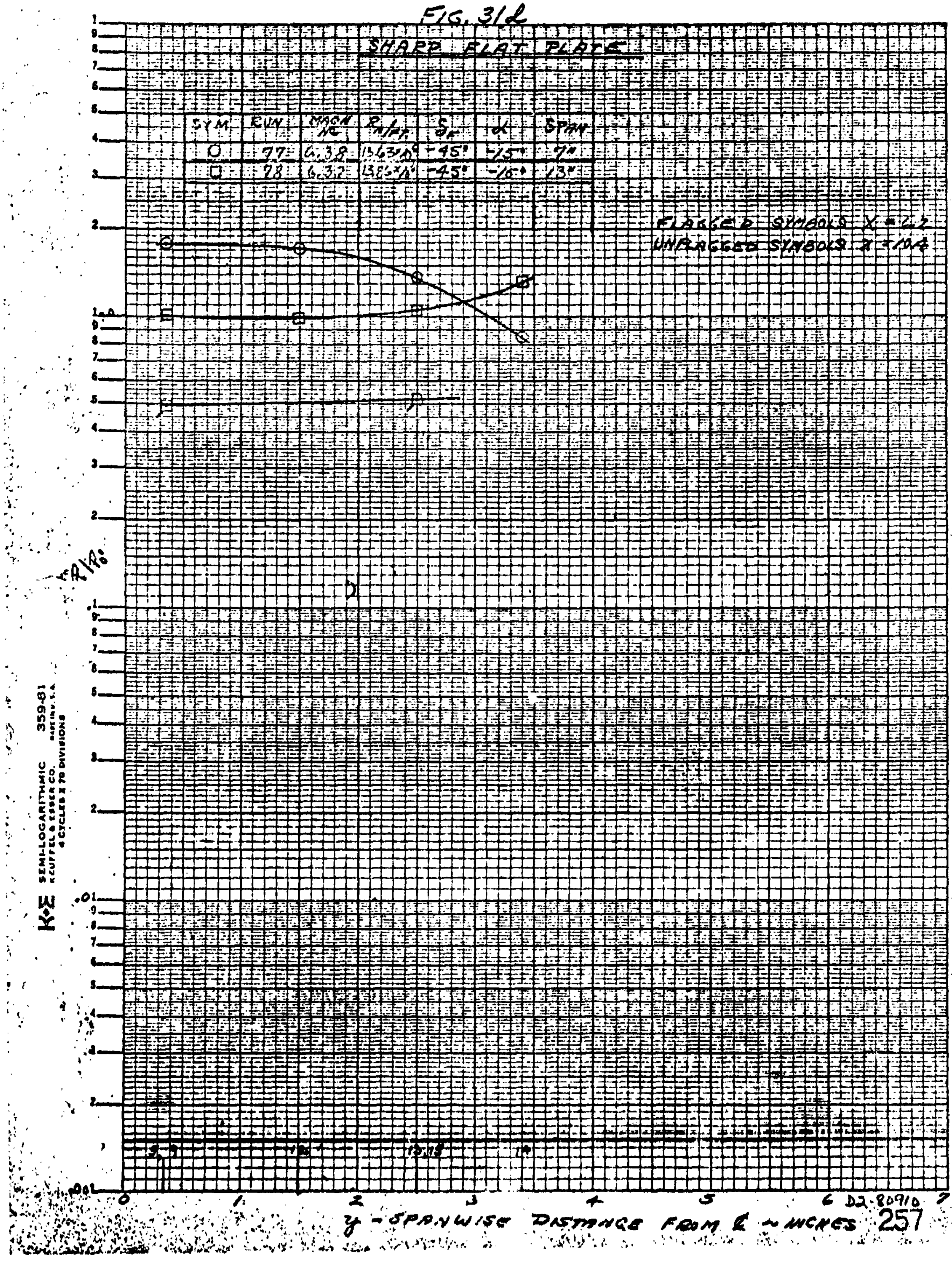

SHARP FLAT PLATE
SYM
RUN
MACH
SPAN
77
78
-45°
-15°
$\dot{q}_{AVG}$ ~ BTU/FT² SEC.
X ~ INCHES
FLAP HINGE LINE
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 31d



SHARP FLAT PLATE
SYM | RUN | MACH NO | $R_N/FT.$ | δ_F | α | SPAN
○ | 77 | 6.38 | 1.363×10^6 | -45° | -15° | 7"
□ | 78 | 6.37 | 1.385×10^6 | -45° | -16° | 13"
FLAGGED SYMBOLS X = 6.2
UNFLAGGED SYMBOLS X = 10.4
P/P_0
y - SPANWISE DISTANCE FROM ℄ ~ INCHES
KE SEMI-LOGARITHMIC 359-81 KEUFFEL & ESSER CO. 4 CYCLES X 70 DIVISIONS

FIG. 31a

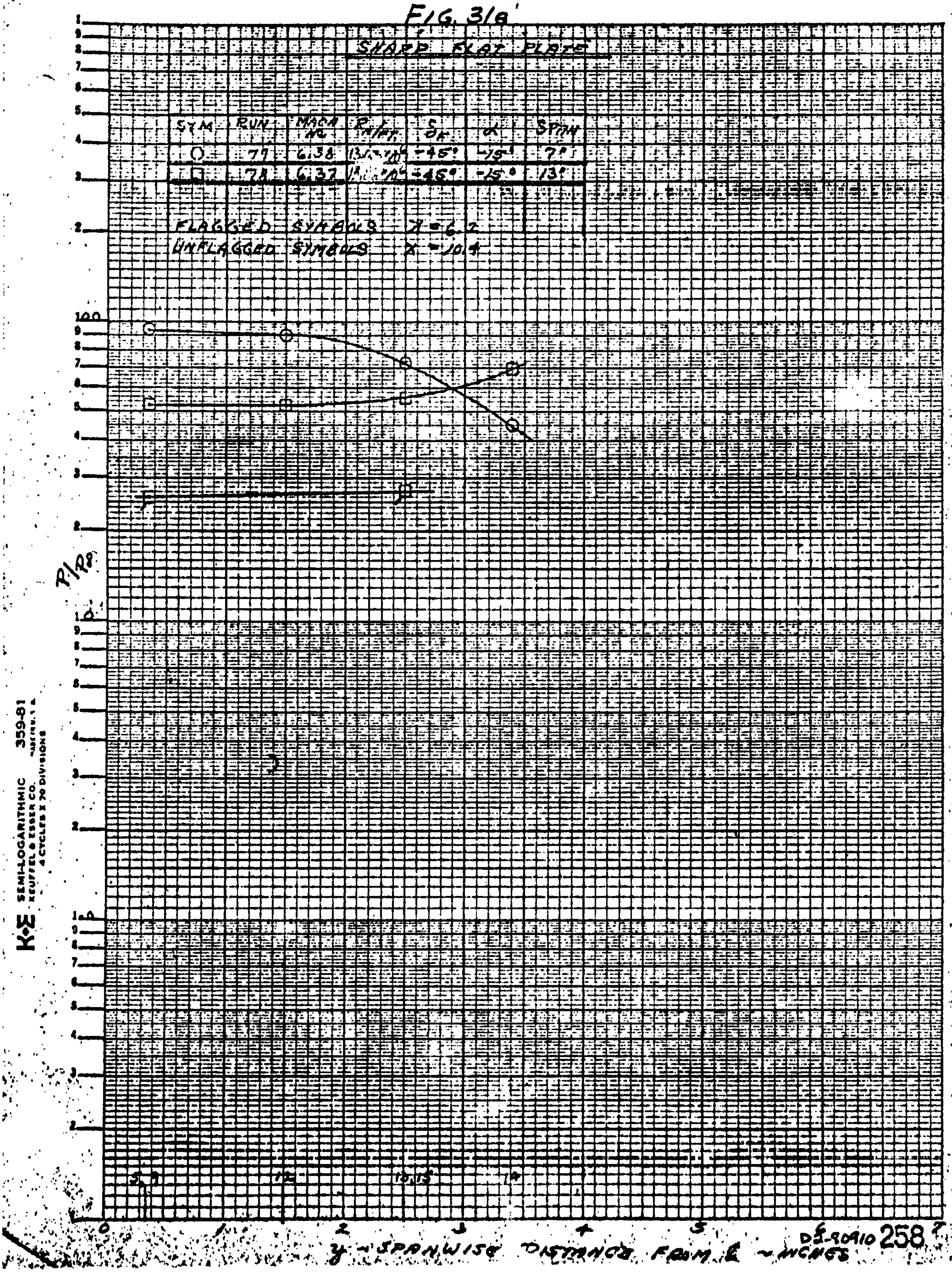
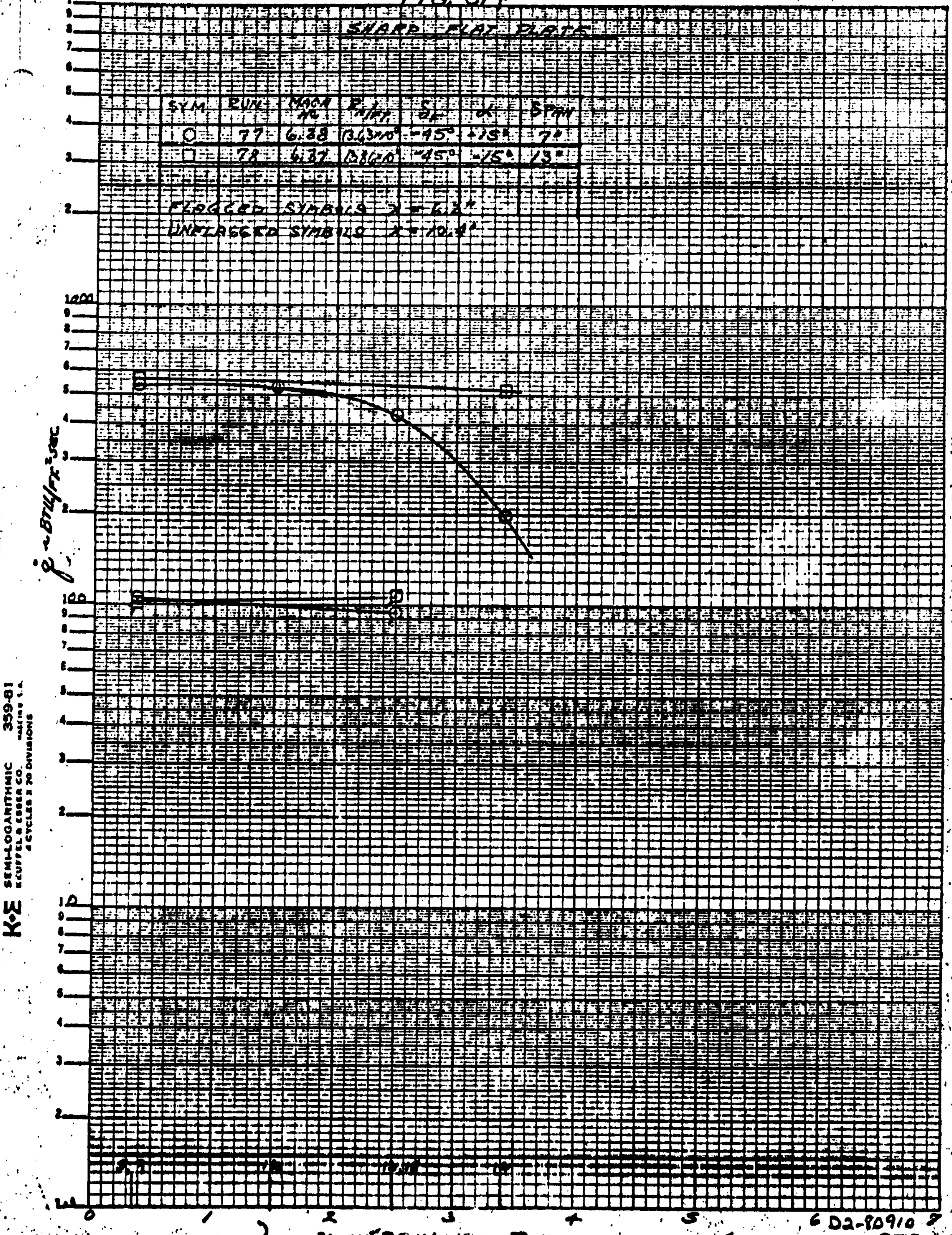

SHARP FLAT PLATE
SYM RUN MACH NO. R_N/FT. δ_F α SPAN
○ 77 6.38 -45° -15° 7°
□ 78 6.37 -45° -15° 13°
FLAGGED SYMBOLS x = 6.2
UNFLAGGED SYMBOLS x = 10.4
P/P8
y ~ SPANWISE DISTANCE FROM ℄ ~ INCHES

FIG. 31f



SHARP - FLAT PLATE
SYM RUN MACH NO. R/INT. δ α SPAN
○ 77 6.88 13.63×10⁶ -45° +15° 7"
□ 78 6.87 13.86×10⁶ -45° -15° 13"
FLAGGED SYMBOLS X = 6.2"
UNFLAGGED SYMBOLS X = 10.4"
q̇ ~ BTU/FT²SEC
1000
100
10
0 1 2 3 4 5 6 7
y ~ SPANWISE DISTANCE FROM ℄ ~ INCHES
K•E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

EFFECT OF SPAN VARIATION ON PRESSURE AND HEAT TRANSFER

DISTRIBUTIONS OVER A SHARP FLAT PLATE

$\alpha = -15^{\circ}$

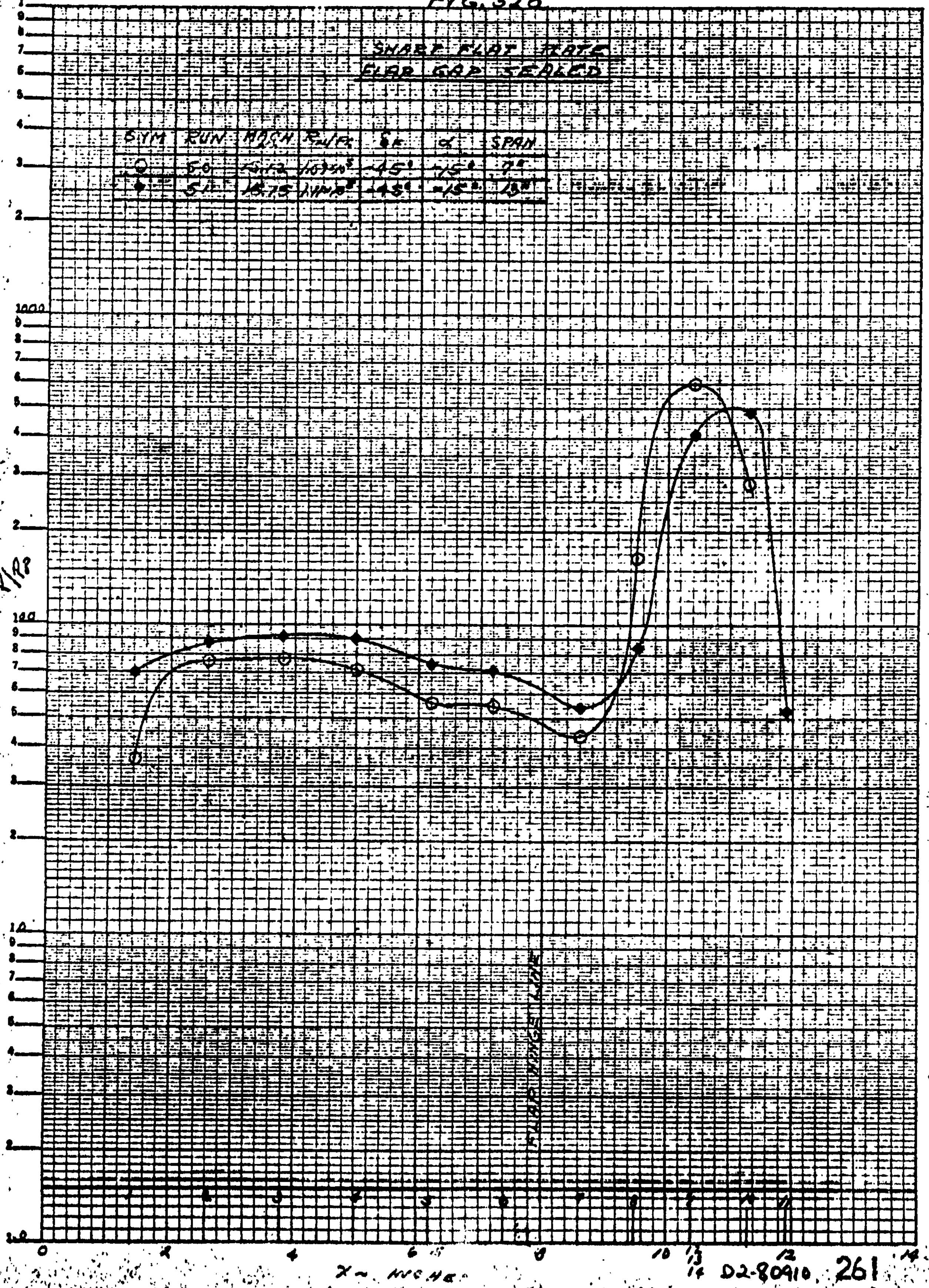
$\delta_F = -45^{\circ}$

$M_{\infty} = 15.1$

$R_N/\text{ft.} = 1.1 \times 10^5$

FIGURE 32

FIG. 320



SHARP FLAT PLATE
FLAP GAP SEALED
SYM RUN MACH
SPAN
FLAP HINGE LINE
X ~ INCHES

FIG. 326

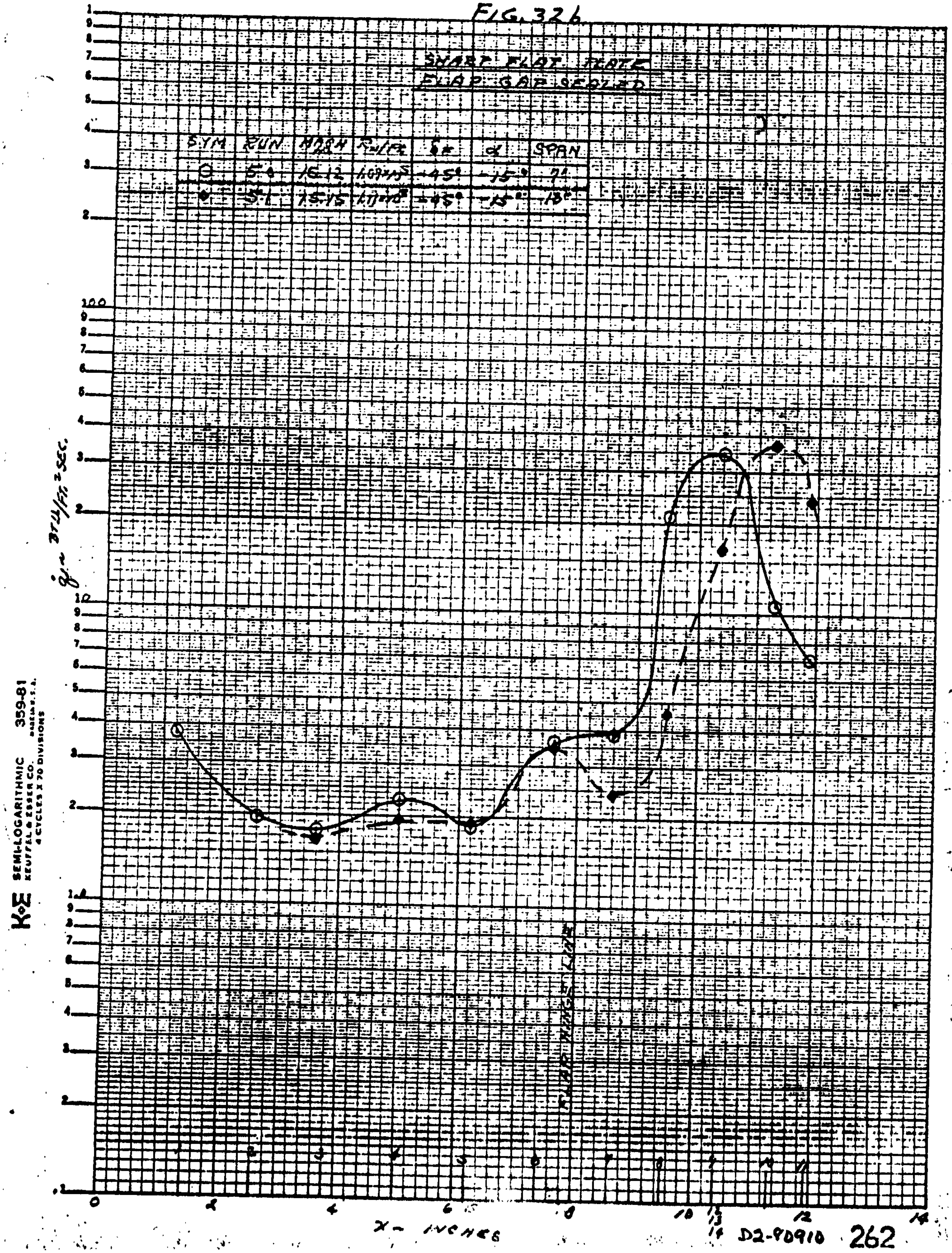
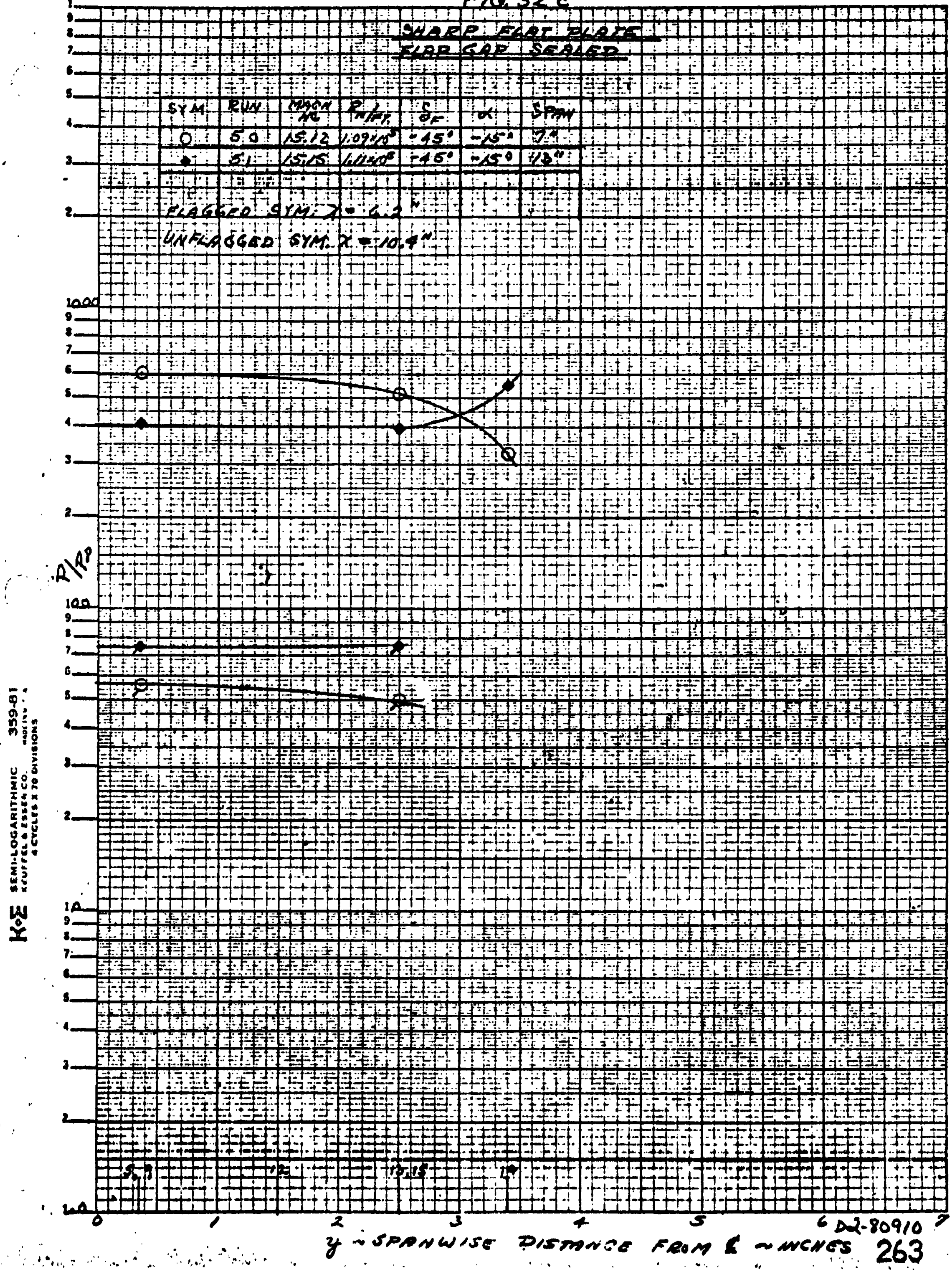
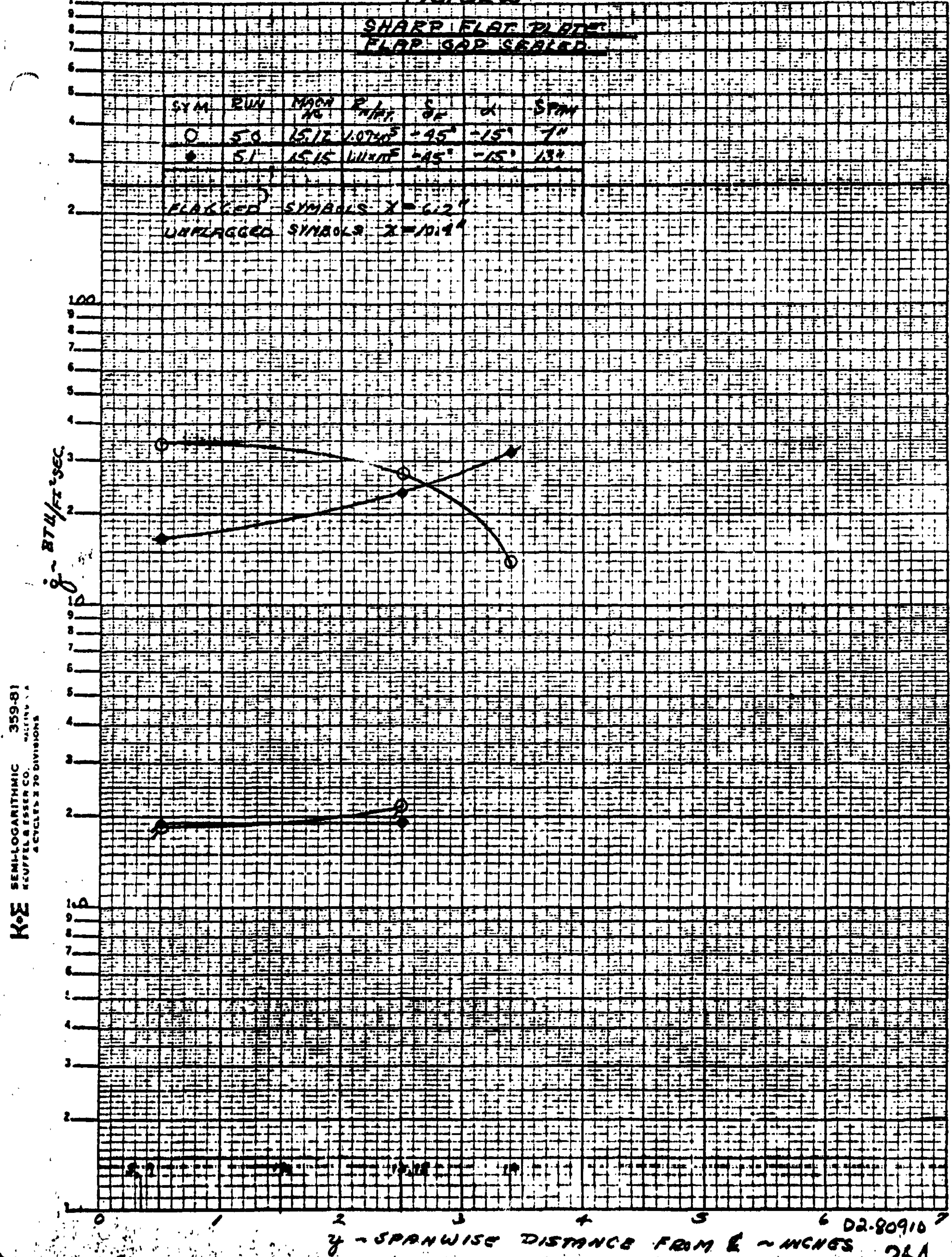

SHARP FLAT PLATE
FLAP GAP SEALED
SYM RUN MACH Re/FT δF α SPAN
54 16.12 -45° -15° 7"
51 15.15 -45° -15° 13"
FLAP HINGE LINE
q ~ BTU/FT² SEC.
X ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 32 c



D2-80910

FIG. 32d


SHARP FLAT PLATE
FLAP GAP SEALED
SYM RUN MACH NO. R/FT. δF α SPAN
○ 50 15.12 1.07x10^5 -45° -15° 7"
● 51 15.15 1.11x10^5 -45° -15° 13"
FLAGGED SYMBOLS X=6.2"
UNFLAGGED SYMBOLS X=10.4"
q̇ ~ BTU/FT²SEC
y - SPANWISE DISTANCE FROM ℄ ~ INCHES
0
1
2
3
4
5
6
7
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

EFFECT OF FLAP GAP SEAL ON THE PRESSURE AND HEAT TRANSFER

DISTRIBUTION ON A SHARP FLAT PLATE

$\alpha = -15^{\circ}$

$\delta_F = 0$

$M_{\infty}' = 6.38$

$R_N/\text{ft.} = 14 \times 10^6$

FIGURE 33

FIG. 33a

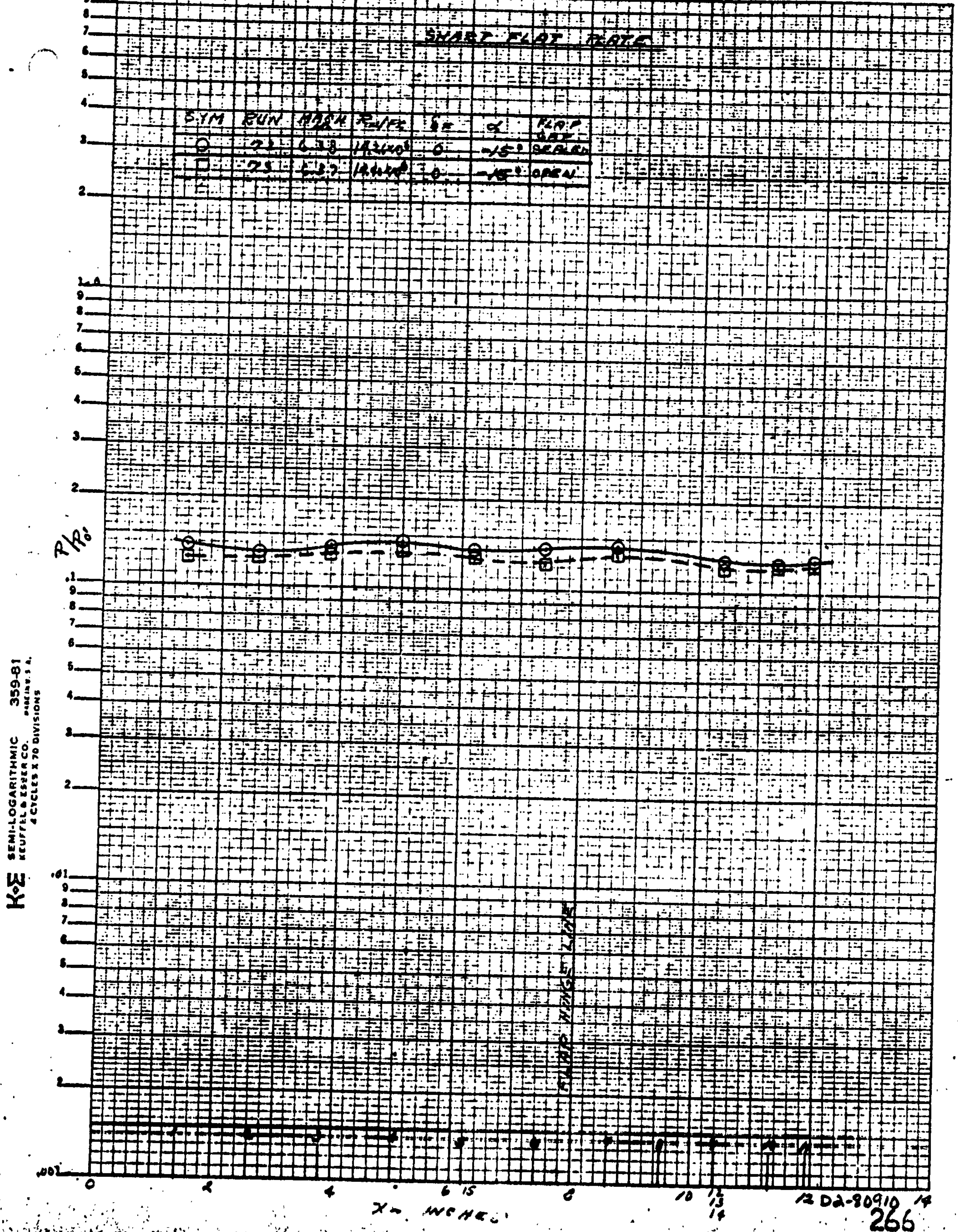

SHARP FLAT PLATE
SYM
RUN
FLAP GAP
SEALED
OPEN
P/P0
FLAP HINGE LINE
X ~ INCHES

FIG. 33b

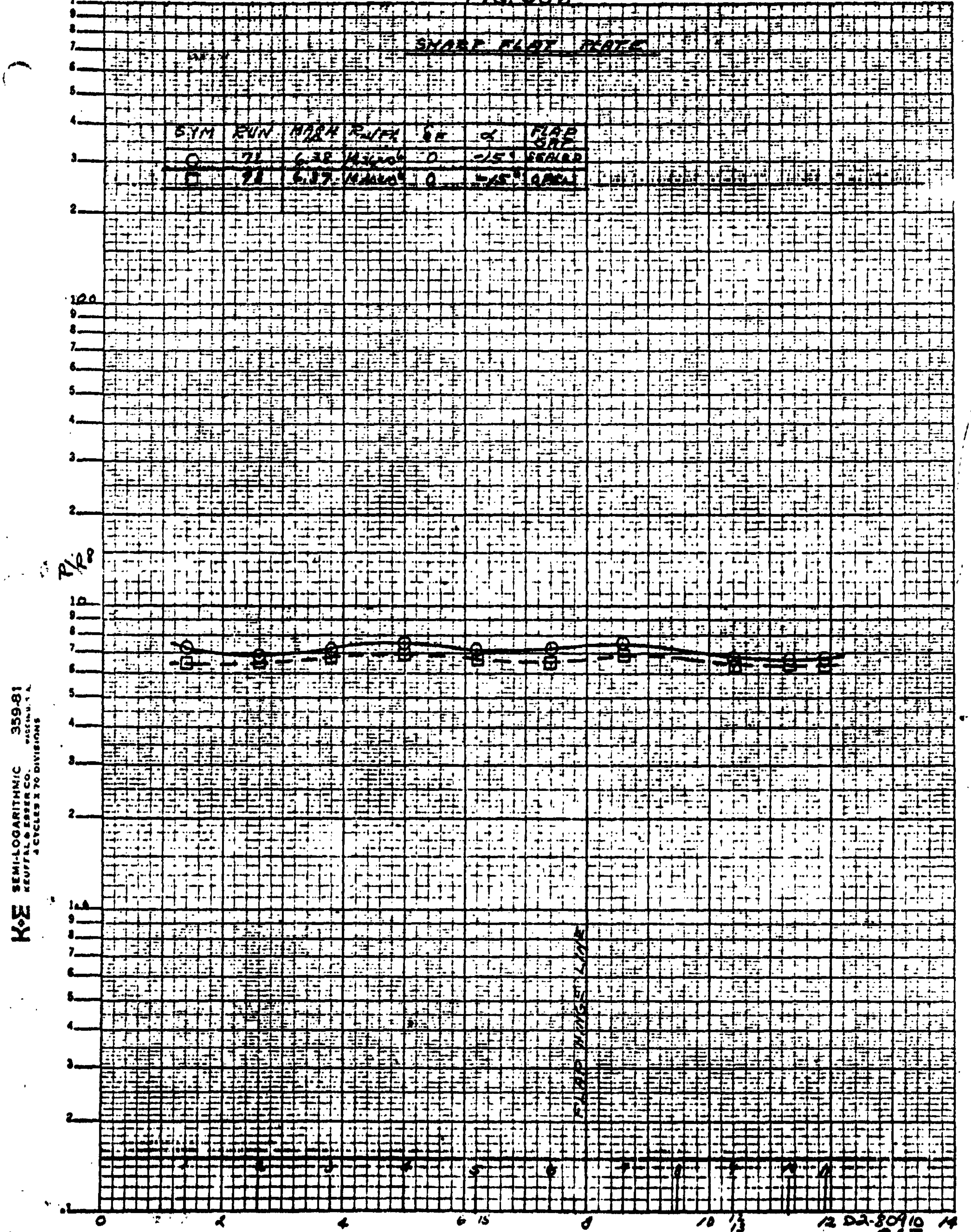
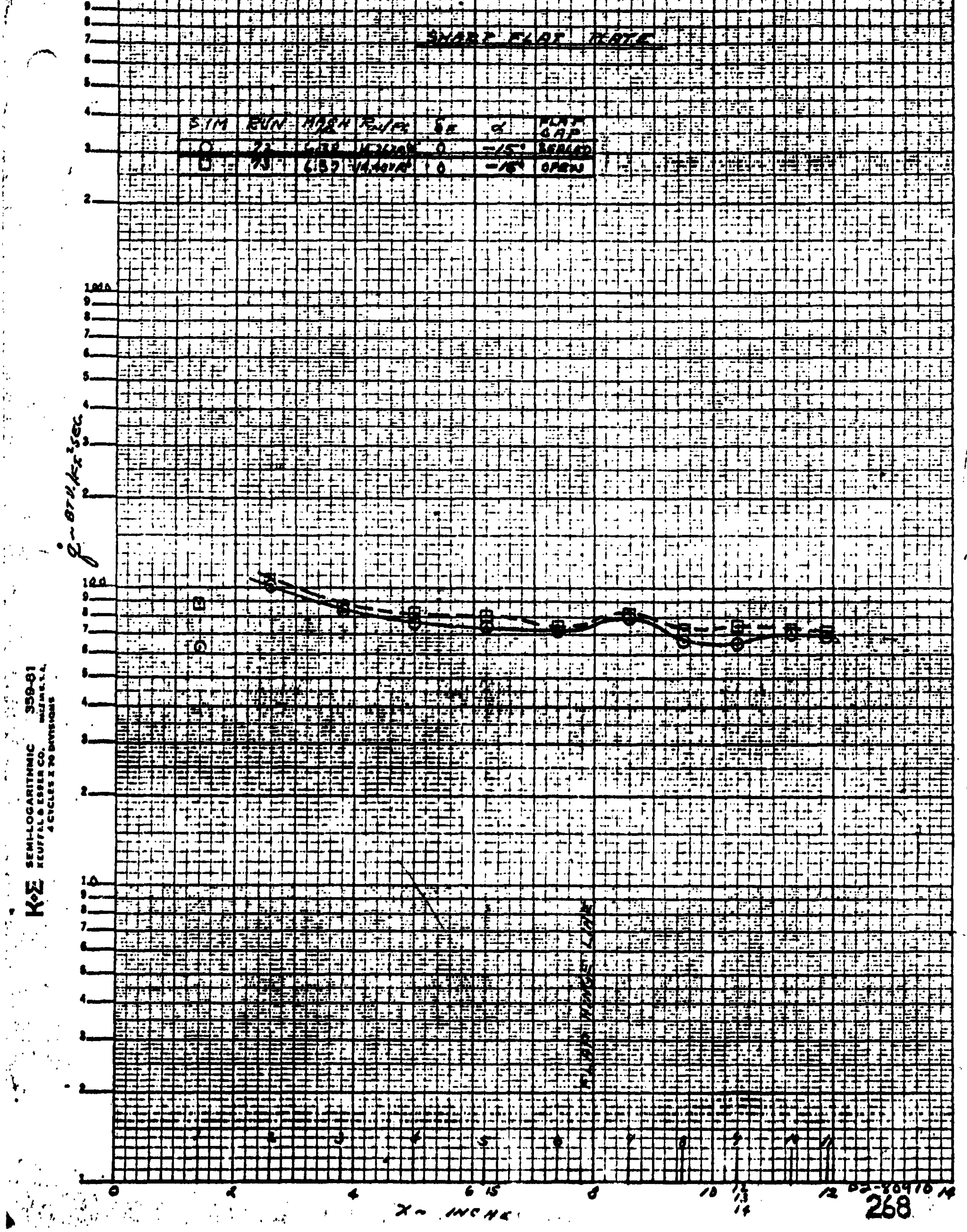

SHARP FLAT PLATE
SYM RUN MACH α FLAP GAP
71 6.38 0 -15° SEALED
98 6.37 0 -15° OPEN
FLAP HINGE LINE
X ~ INCHES
0 2 4 6 8 10 12 14
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

FIG. 33 C.


SHARP FLAT PLATE
SIM
RUN
MACH
δE
α
FLAP GAP
73
6.37
0
-15°
OPEN
$\dot{q}$ ~ BTU/FT² SEC
X ~ INCHES
FLAP HINGE LINE
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

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EFFECT OF FLAP GAP SEAL ON THE PRESSURE AND HEAT TRANSFER

DISTRIBUTION ON A SHARP FLAT PLATE

$\alpha = -15^\circ$

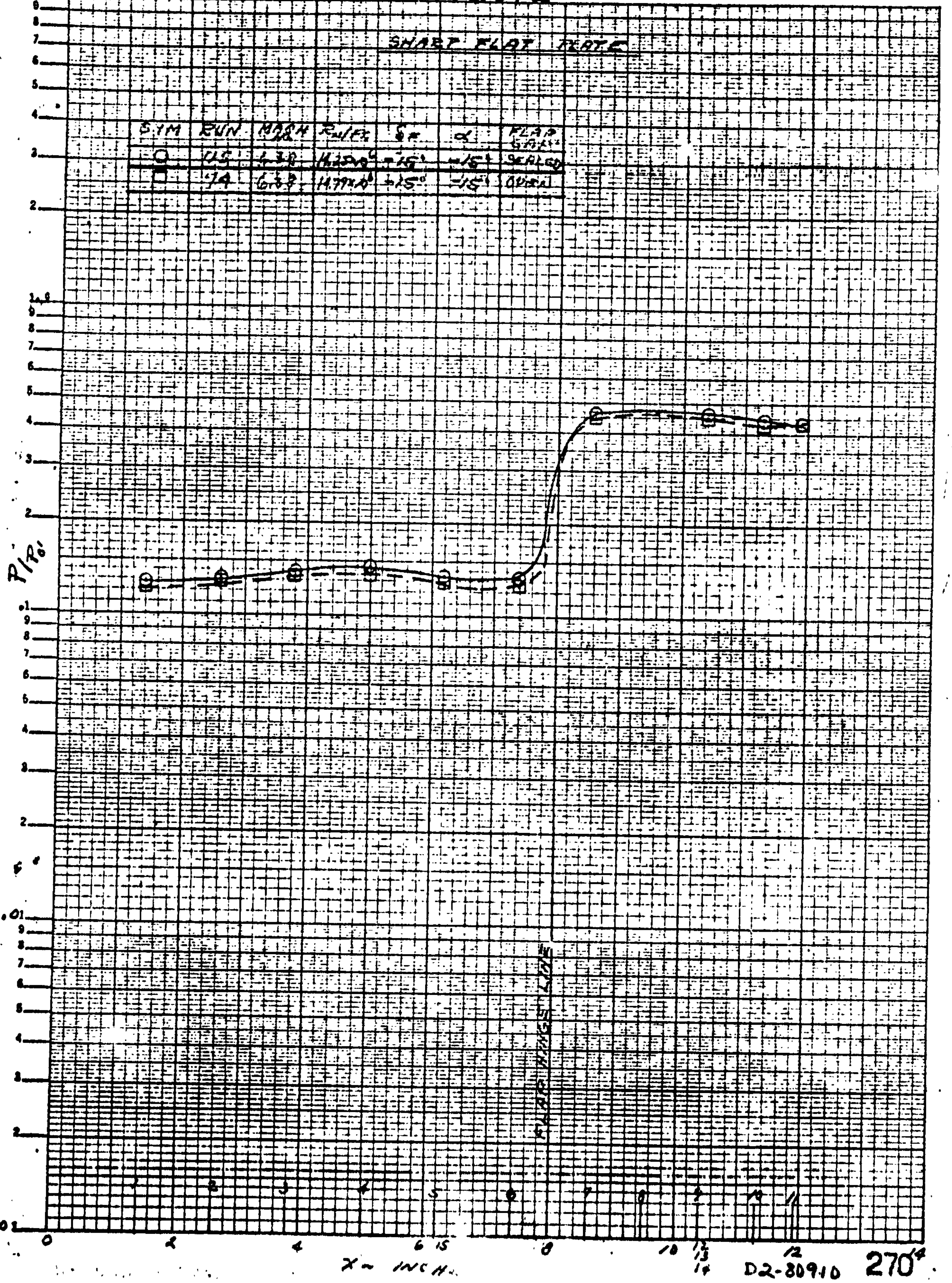
$\delta_F = -15^\circ$

$M_\infty = 6.38$

$R_N/\text{ft.} = 14 \times 10^6$

FIGURE 34

FIG. 34a



D2-80910

FIG. 34b

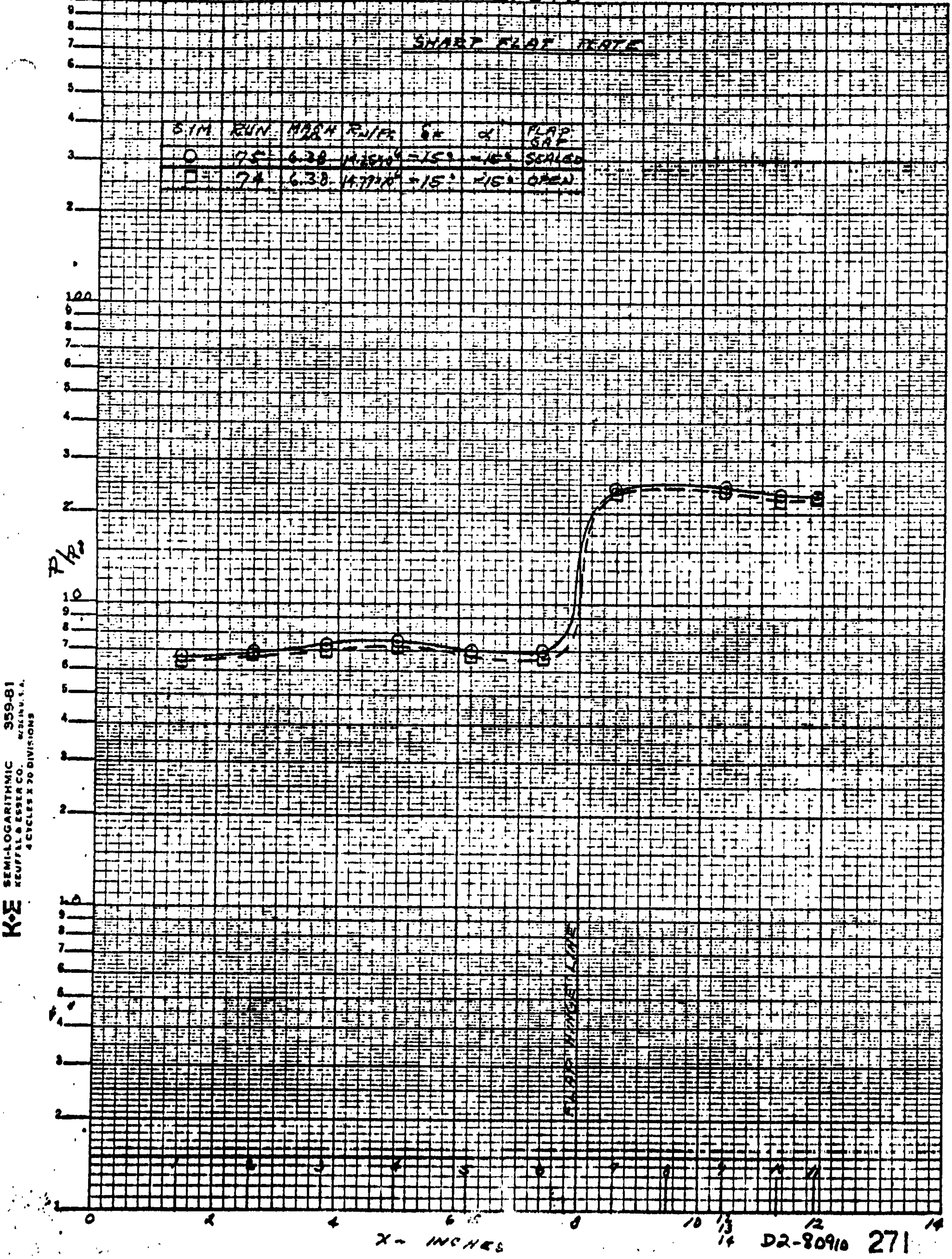
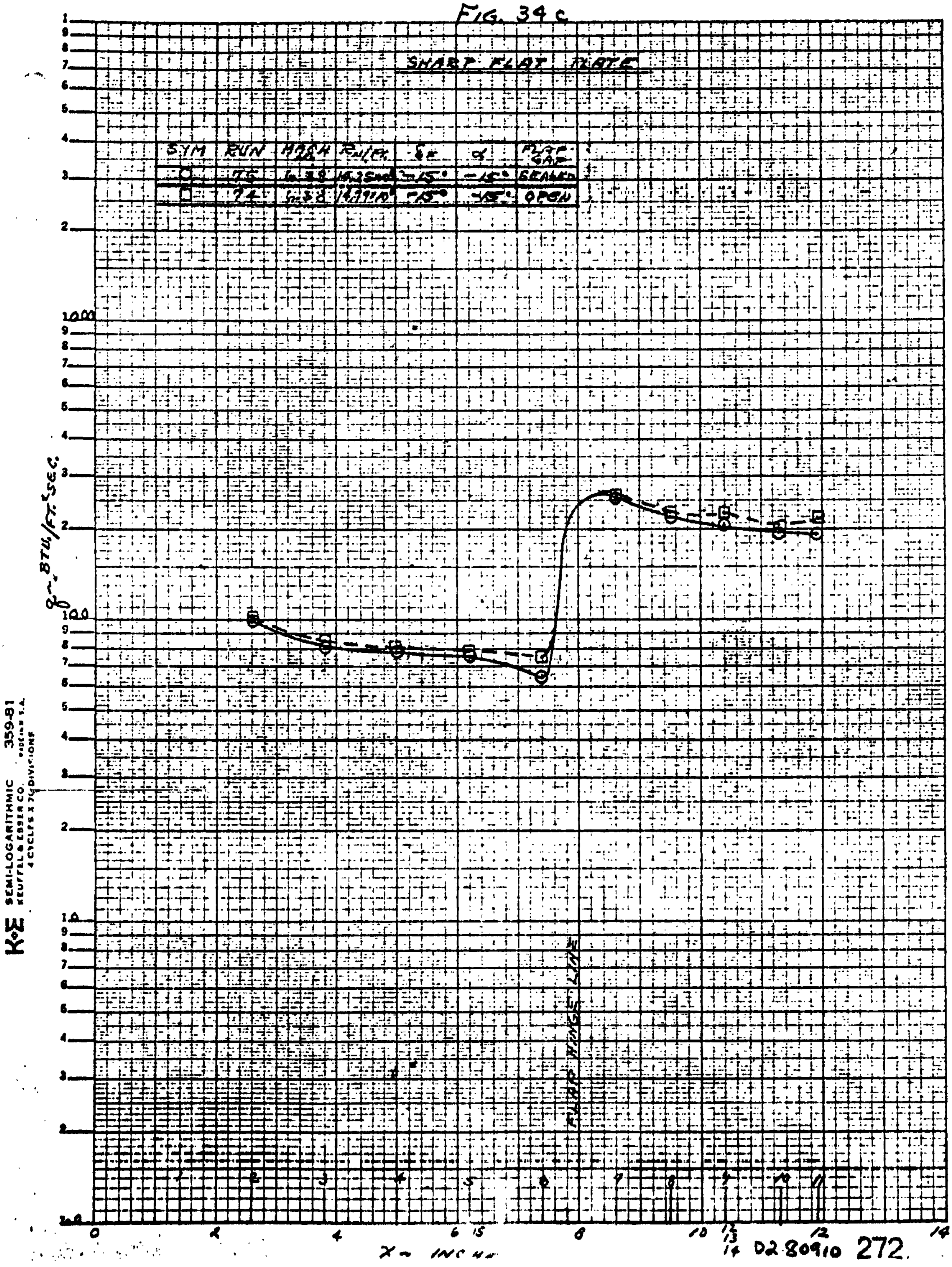

SHARP FLAT PLATE
SYM
RUN
MACH
α
FLAP GAP
75
6.38
SEALED
74
6.38
OPEN
P/P∞
FLAP HINGE LINE
X ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 34c


SHARP FLAT PLATE
SYM
RUN
MACH
α
FLAP GAP
SEALED
OPEN
FLAP HINGE LINE
X ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.

EFFECT OF FLAP GAP SEAL ON THE PRESSURE AND HEAT TRANSFER

DISTRIBUTION ON A SHARP FLAT PLATE

$\alpha = -15^{\circ}$

$\delta_F = -45^{\circ}$

$M_{\infty} = 6.38$

$R_N/ft. = 14 \times 10^6$

FIGURE 35

FIG. 35a

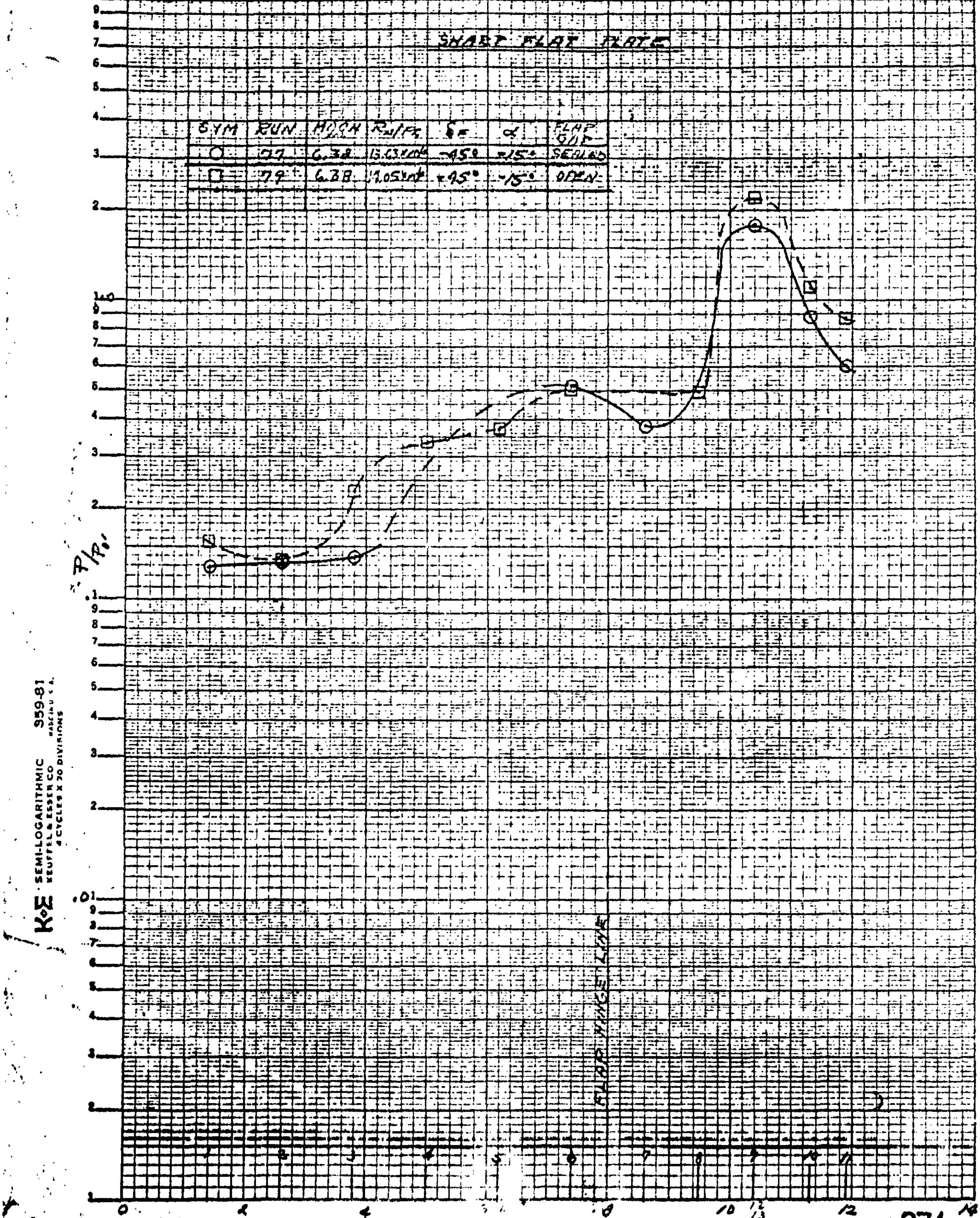

SHARP FLAT PLATE
SYM | RUN | MACH | R_N/FT | δ_F | α | FLAP GAP
○ | 77 | 6.38 | 15.63×10⁶ | -45° | -15° | SEALED
□ | 79 | 6.38 | 17.05×10⁶ | -45° | -15° | OPEN
P/P₀
FLAP HINGE LINE
KE SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 35b

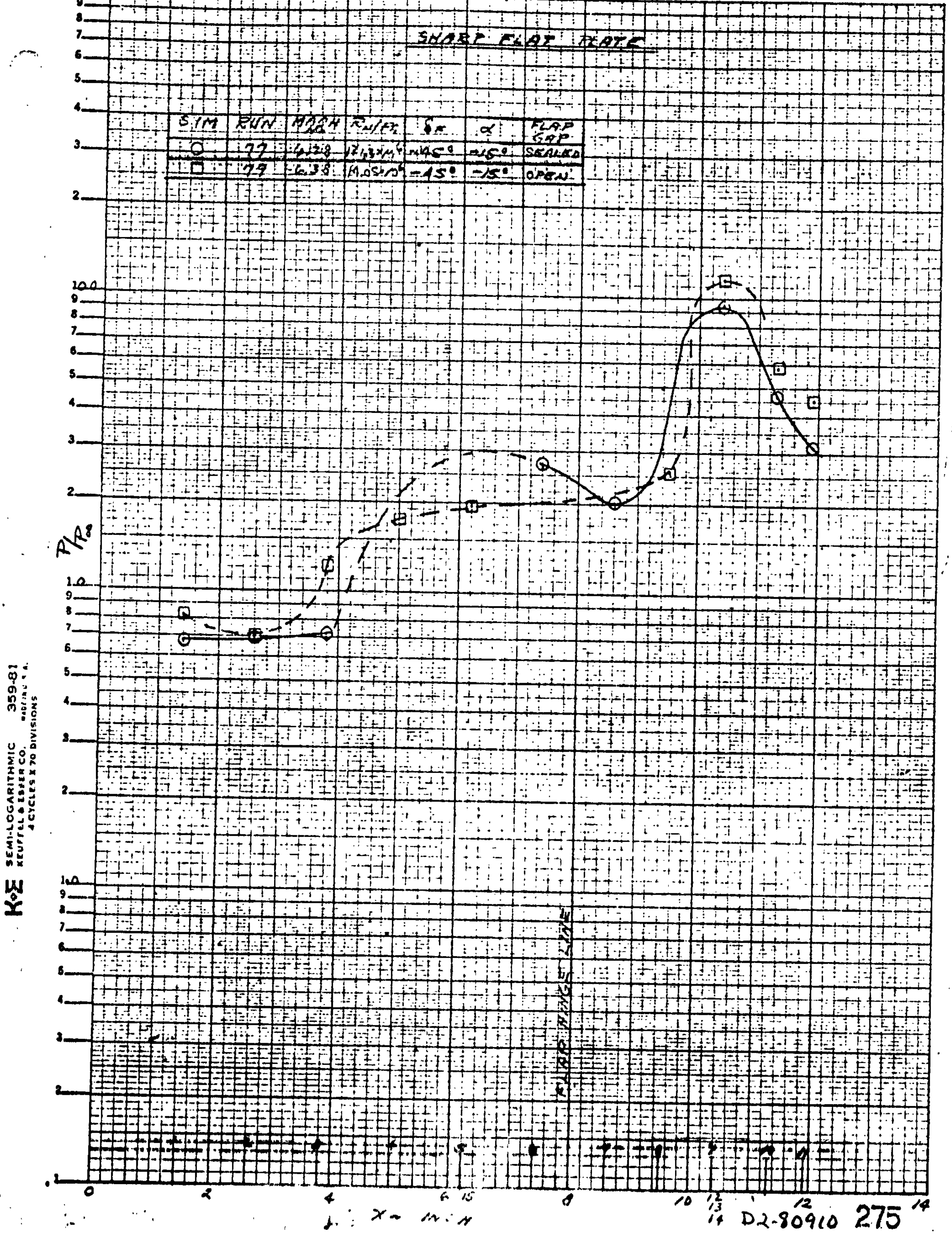

SHARP FLAT PLATE
SYM | RUN | MACH | R_N/FT. | δ_F | α | FLAP GAP
○ | 77 | 6.28 | 17.3×10^6 | −15° | −15° | SEALED
□ | 79 | 6.38 | 14.05×10^6 | −15° | −15° | OPEN
P/P∞
FLAP HINGE LINE
X ~ INCH
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 35C

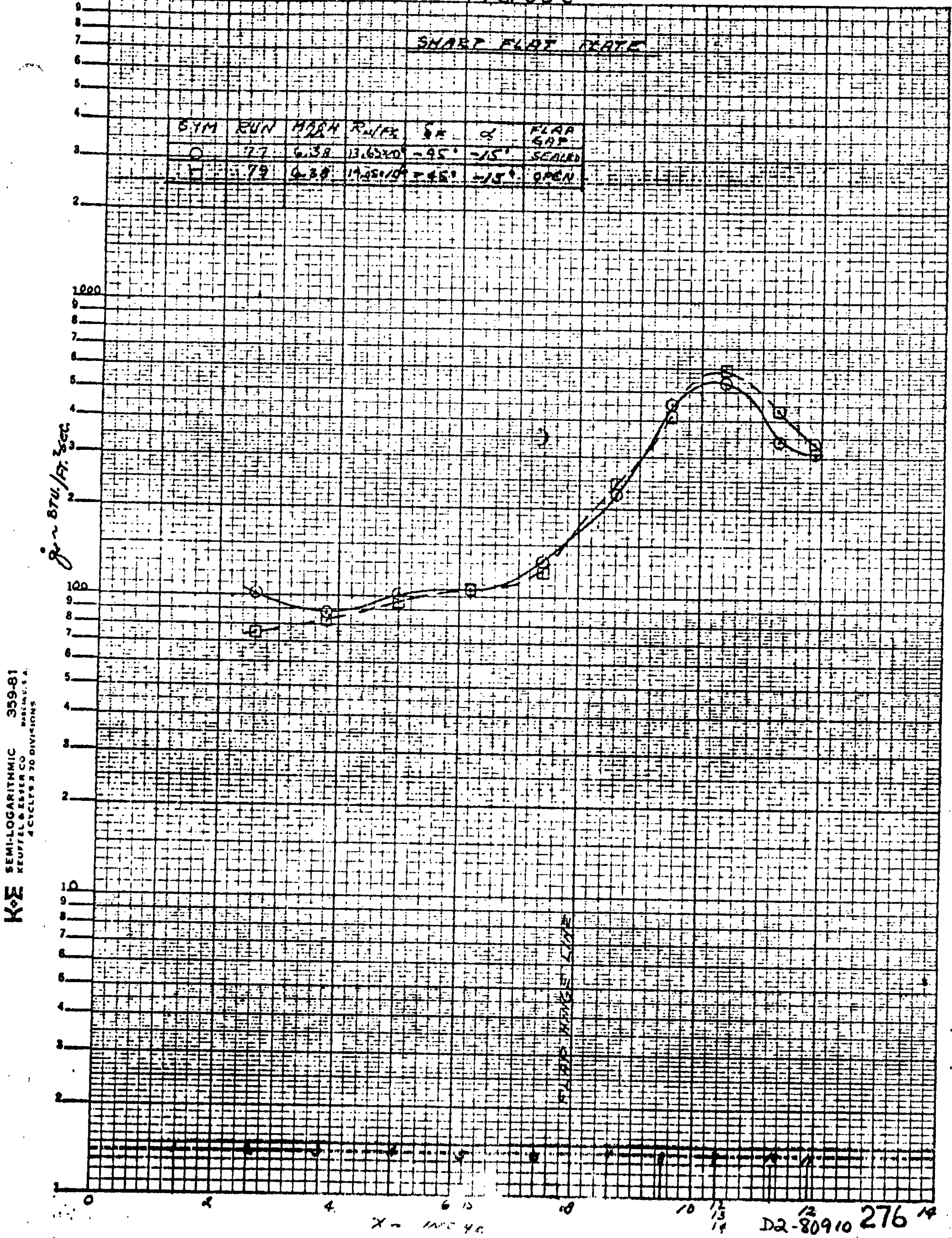

SHARP FLAT PLATE
SYM | RUN | MACH | R_N/FT | δ_F | α | FLAP GAP
○ | 77 | 6.38 | 13.65×10⁶ | −45° | −15° | SEALED
□ | 79 | 6.38 | 14.25×10⁶ | −45° | −15° | OPEN
$\dot{q}$ ~ BTU/FT.² SEC
X ~ INCHES
FLAP HINGE LINE
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO. MADE IN U.S.A.
4 CYCLES X 70 DIVISIONS

FIG. 35 L

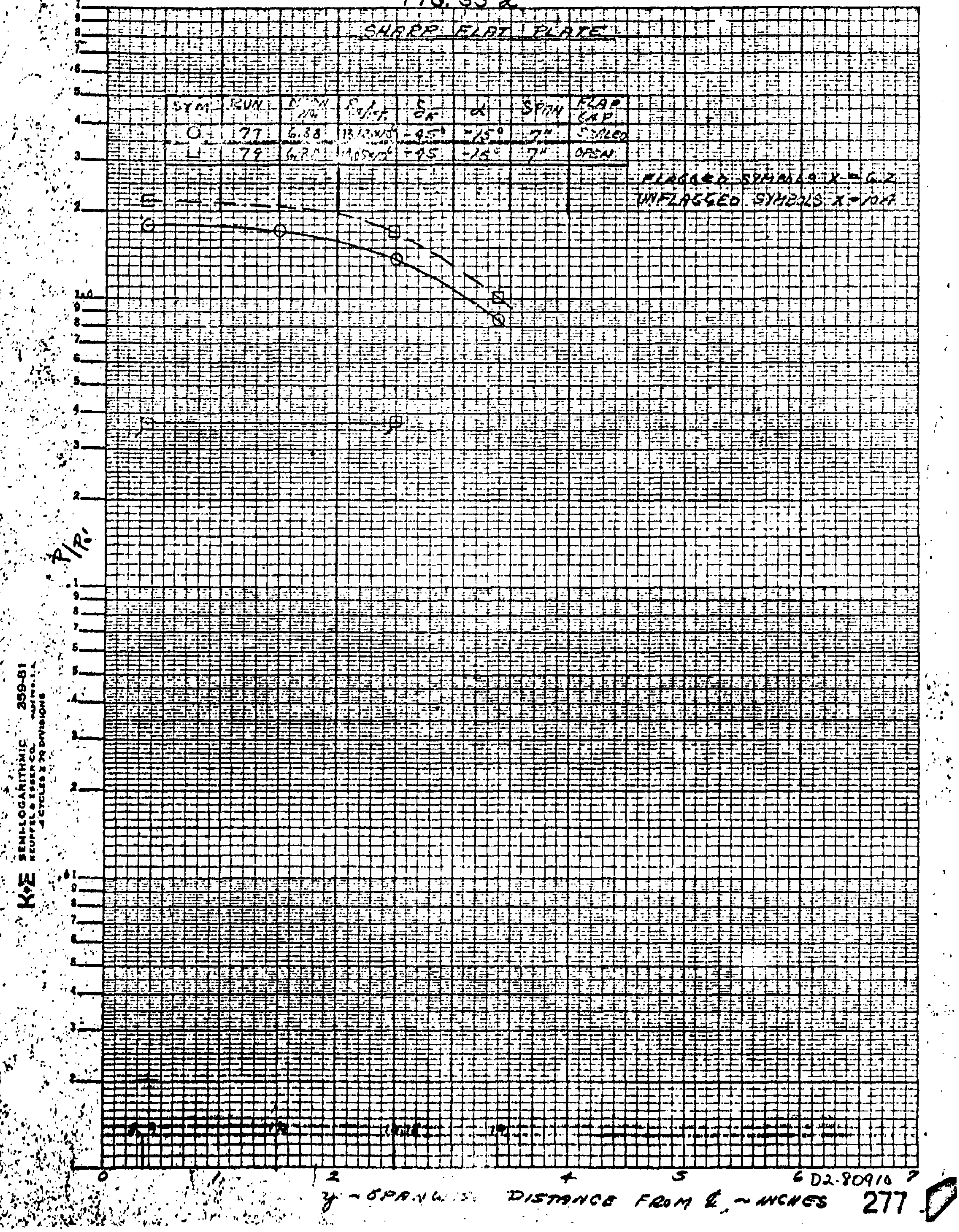


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FIG. 35 e

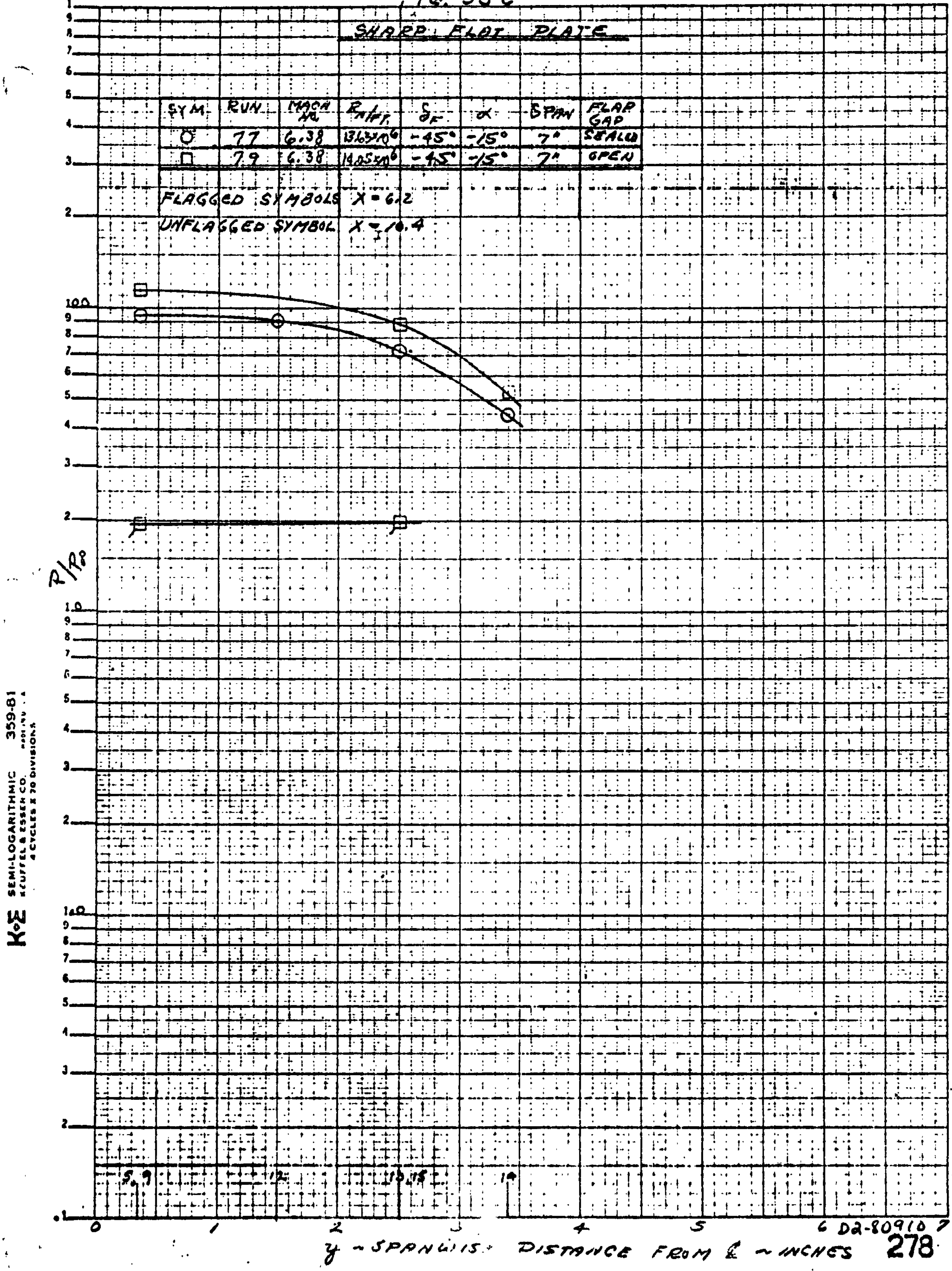
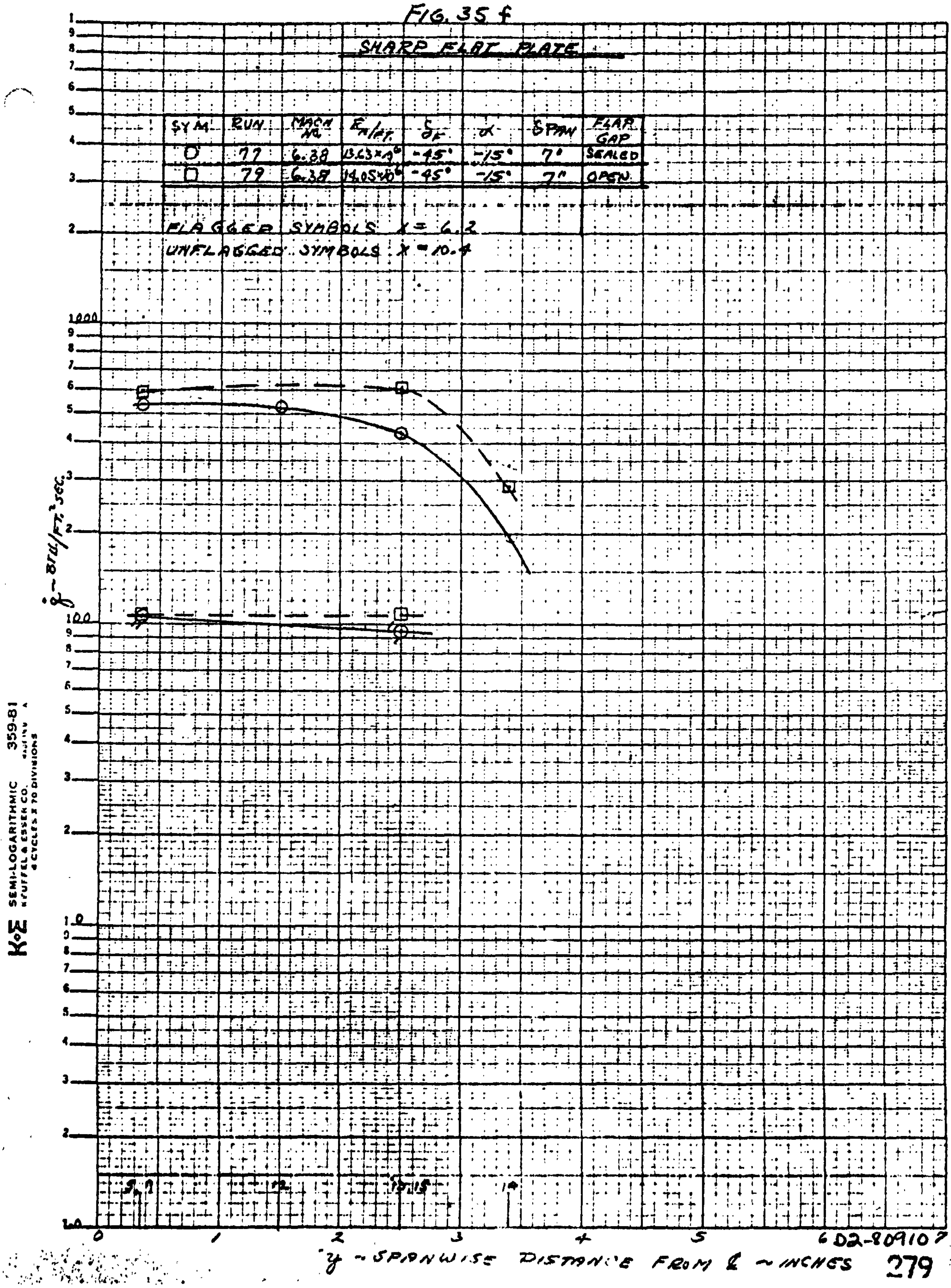

SHARP FLAT PLATE
SYM | RUN | MACH | $R_N/FT.$ | δ_F | α | SPAN | FLAP GAP
○ | 77 | 6.38 | 13.63×10^6 | -45° | -15° | 7" | SEALED
□ | 79 | 6.38 | 14.05×10^6 | -45° | -15° | 7" | OPEN
FLAGGED SYMBOLS X = 6.2
UNFLAGGED SYMBOL X = 10.4
R/R8
5.9
12
13.15
14
0
1
2
3
4
5
6
7
y ~ SPANWISE DISTANCE FROM ℄ ~ INCHES
KE SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 35 f



6D2-80910-7

EFFECT OF VARIATION IN TEST CONDITIONS ON THE PRESSURE AND HEAT TRANSFER DISTRIBUTIONS OVER A SHARP FLAT PLATE

$\alpha = -15^{\circ}$

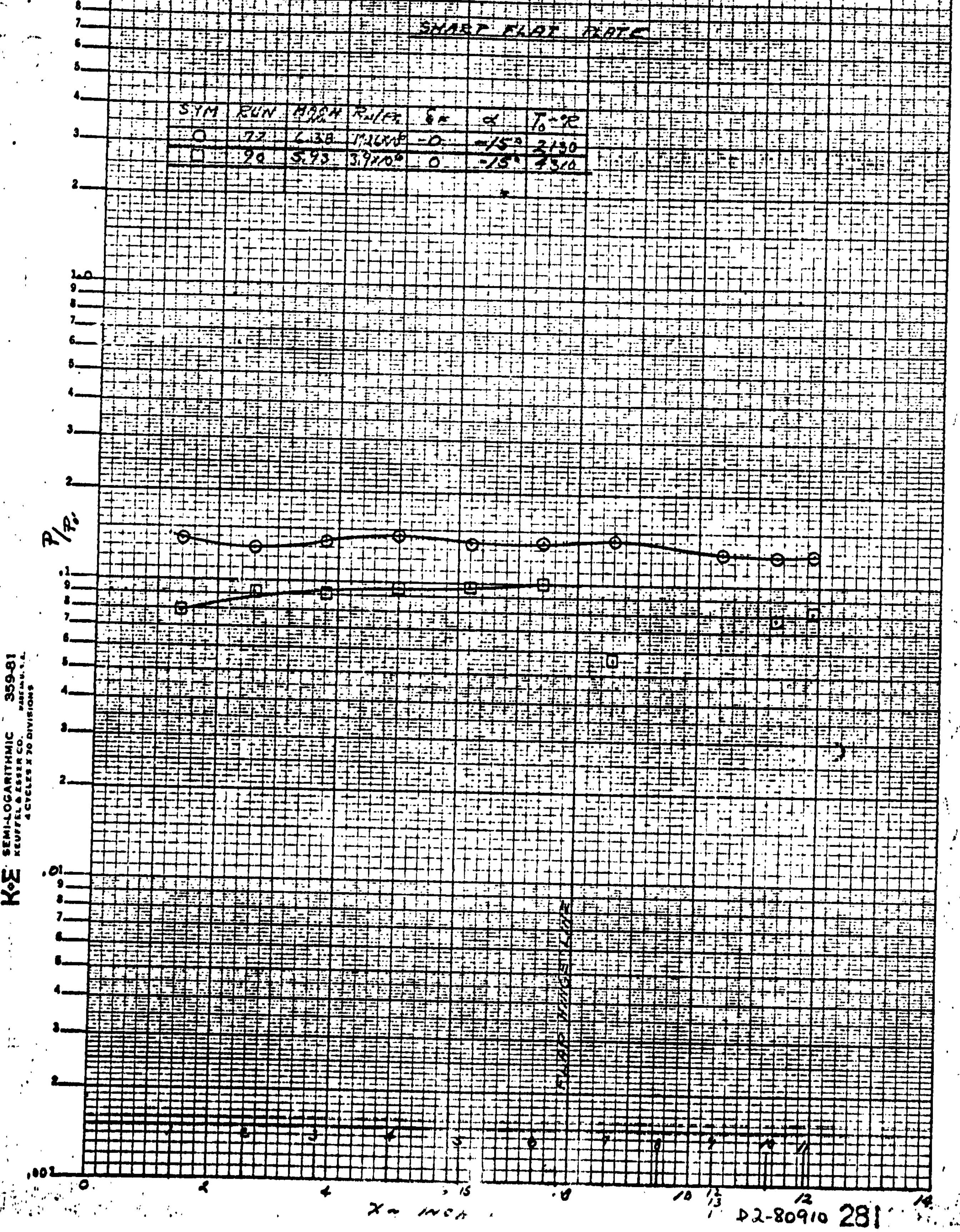
$\delta_F = 0^{\circ}$

$M = 5.93 \rightarrow 6.38$

$R_N/ft. = 3.9 \times 10^6 \rightarrow 14.26 \times 10^6$

FIGURE 36

FIG 36a



SHARP FLAT PLATE
SYM RUN MACH R_N/FT. δ_F α T_0-°R
○ 77 6.38 7.26x10⁶ -0- -15° 2130
□ 90 5.93 3.9x10⁶ 0 -15° 2310
P/P₀
FLAP HINGE LINE
X ~ INCH
K&E SEMI-LOGARITHMIC 359-81 KEUFFEL & ESSER CO. 4 CYCLES X 70 DIVISIONS

FIG. 36 b

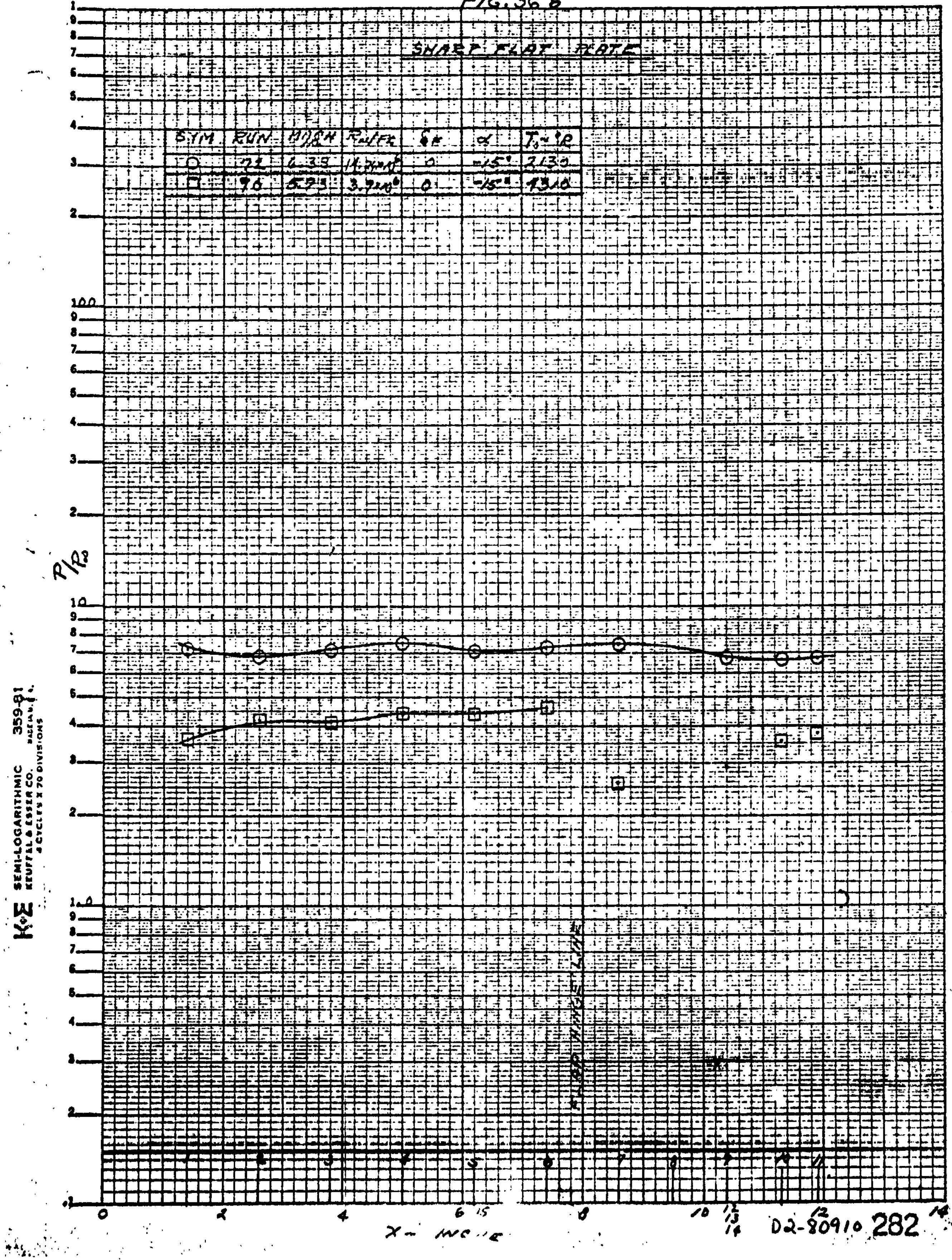
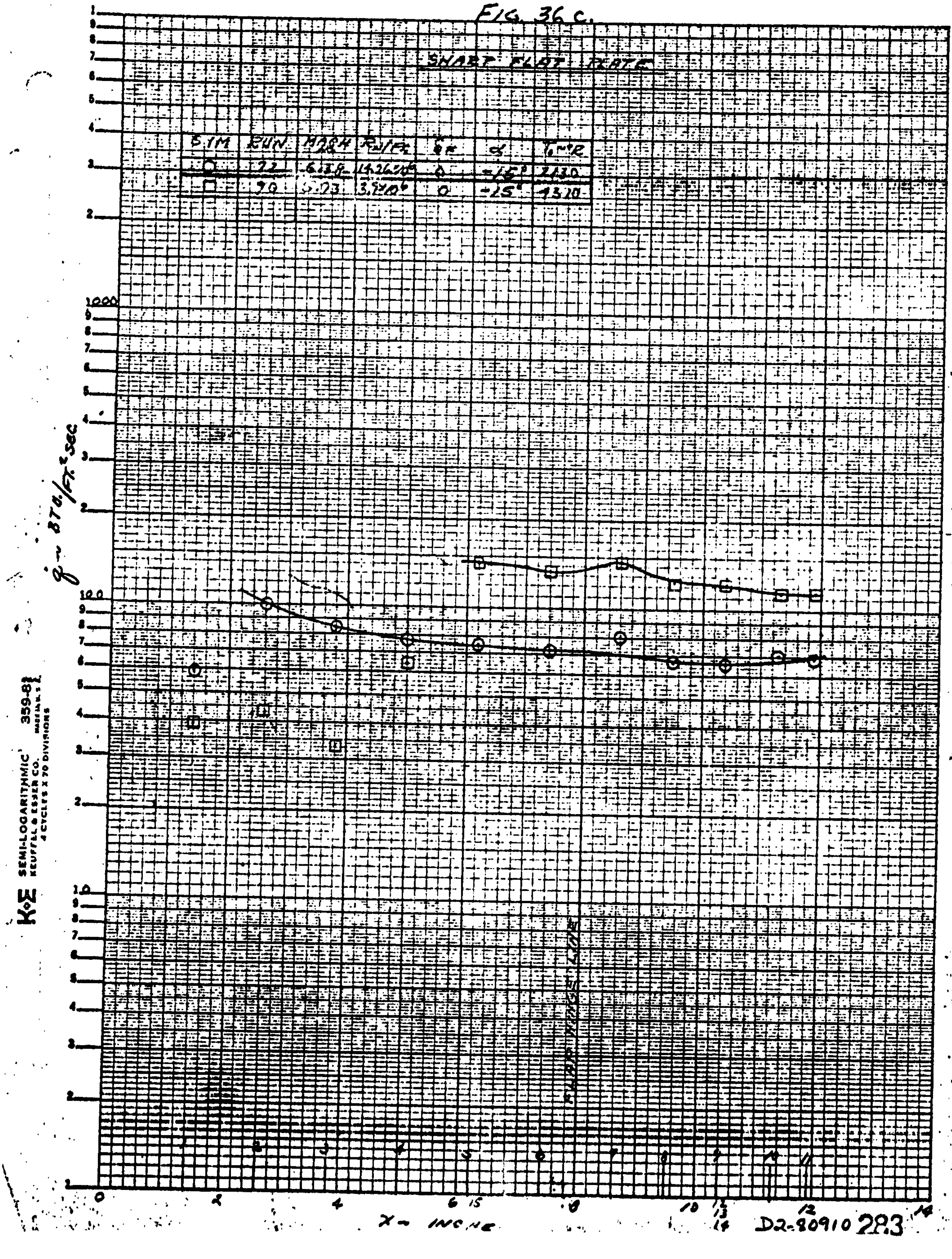

SHARP FLAT PLATE
SYM RUN MACH Re/FT δ α T₀ ~ °R
○ 72 6.33 14.7×10⁶ 0 -15° 2130
□ 96 5.73 3.7×10⁶ 0 -15° 1310
P/P∞
X ~ INCHES
KEUFFEL & ESSER CO. SEMI-LOGARITHMIC 359-81
4 CYCLES X 70 DIVISIONS

FIG. 36 c.


SIM
RUN
MACH
72
6.78
2130
70
1320
x ~ INCHE
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

APPENDIX A

DATA REDUCTION PROCEDURE
CAL 48-inch Hypersonic Shock Tunnel

I. **Test Conditions**

A. Measured Test Quantities

1. p_o - supply pressure $\sim$ psi

2. t_i - time for incident shock to travel a distance of 5 feet $\sim$ microseconds

B. Computed Test Quantities

1. $M_i = \frac{U_i}{a} = 882.1 \left(\frac{5}{t_i}\right)$ for a = 1133 fps.

2. $H_o \times 10^{-6} = 3.21 + \left(\frac{5}{t_i}\right)^2 \times 10^6 \times \phi$

Fig. 1

3. M_∞ - obtained from nozzle airflow calibration

4. $p_\infty = \left(\frac{p}{p_p}\right)(1 + .2\, M_\infty^{\,2})^{-3.5}\, P_o$

where $\frac{p}{p_p}$ is from Fig. 2

5. $q_\infty = .7\, p_\infty M_\infty^{\,2}$

6. $T_\infty = 166.5\,(H_o \times 10^{-6})\,(1 + .2\, M^2)^{-1}$

7. $\rho_\infty \times 10^6 = \frac{p_\infty}{R\,T_\infty} = 83{,}920\ \frac{p_\infty}{T_\infty}$

8. $U_\infty = 49.01\ (\sqrt{T_\infty})\ (M_\infty)$

9. $R_e/\text{ft.} = \frac{\rho_\infty U_\infty}{\mu_\infty}$

where μ_∞ is from Fig. 3 for T_∞

10. $p_o' = \left(\frac{p_o'}{q_\infty}\right) q_\infty$

where $\frac{p_o'}{q_\infty}$ is from Fig. 4

11. T_o is from Fig. 5

APPENDIX A (Cont'd.)

II. Pressure Data

A. $p \sim$ psi. Absolute model pressure

B. $\frac{p}{p_\infty}$

C. $C_p = \frac{p - p_\infty}{q_\infty}$

D. $\frac{p}{p_o}$

E. $\bar{X} = \frac{M_\infty^3 \sqrt{C^*}}{\sqrt{R_N/\text{ft.} \times x/12}}$

1. $C^* = \frac{\mu^*}{\mu_\infty} \; \frac{T_\infty}{T^*}$

2. $T^* = T_o \left[1 + 3 \frac{T_w}{T_o}\right]$ .1667 $\sim$ degrees Rankine

3. μ^* is from Fig. 3 for temperature T^*

III. Heat Transfer Data

A. Input from temperature time history data is used to compute heat transfer rate time histories

$$\dot{q}_{(t)} = \frac{1}{2\sqrt{\pi t}} \left| \left(\sqrt{\rho C_p K}\right)_n (T_n) \frac{\pi + \sum_{K=1}^{K=n-1} \frac{\sqrt{K}}{(n-K)^{1/2}}}{\sqrt{n}} - \sum_{K=1}^{K=n-1} \frac{T_{(K)} \left(\sqrt{\rho C_p K}\right)_K}{(n-K)^{3/2}} \right.$$

$\dot{q}_{(t)}$ = Heat transfer rate at time (t) $\sim$ BTU/ft-sec.

t = Time interval between readings

$\sqrt{\rho C_p k}$ = conductivity characteristics of insulator

(n) = Last temperature interval

(k) = Previous temperature readings

T = Temperature reading $\sim$ degrees Fahrenheit

Heat transfer time histories are then averaged at an interval consistent with pressure data readings.

B. Computed Data

1. $\dot{q}_{AVG} \sim \frac{\text{BTU}}{\text{ft}^2 \text{ sec.}}$

2. $\frac{\dot{q}}{\dot{q}_o}$

APPENDIX A (Cont'd.)

(a) $\dot{q}_o = 1.25\,(\rho_o'\,\mu_o')^{.44}(\rho_w\,\mu_w)^{.06}\left(1+.191\,\frac{H_D}{H_o}\right)(H_o - H_w)\left(\frac{dU_e}{dx}\right)^{.5} \times 10^{-3}$

(b) $\frac{dU_e}{dx} = \frac{117}{D}\sqrt{T_o'\,Z_o'\left(1-\frac{p_\infty}{p_o'}\right)}$

(c) $T_o' = T_o\left(\frac{T_o'}{T_o}\right)$ where $\frac{T_o'}{T_o}$ is from Ref. 3.

For this test, $\frac{T_o'}{T_o}$ are listed in Table I.

(d) $Z_o' = 1.0$

(e) $\rho_o' \times 10^6 = 83,920\frac{p_o'}{T_o'} \sim$ slugs/feet^3

(f) $\rho_w \times 10^6 = 83,920\,\frac{p_o'}{T_w} \sim$ slugs/feet^3

(g) μ_o' is from Fig. 3 for T_o'

(h) μ_w is from Fig. 3 for $T_w = 533°$ Rankine

(i) $\frac{H_D}{H_o} = 0$ for this test regime

3. $C_H = \frac{778\,\dot{q}_{AVG}}{\rho_\infty U_\infty (H_o - H_w)}$

4. $C_H\sqrt{R_N/\text{ft.} \times x/12}$ where x/12 = local dimension from reference point

5. $\frac{\dot{q}_{AVG}}{(H_o - H_w)}$

Figure Index

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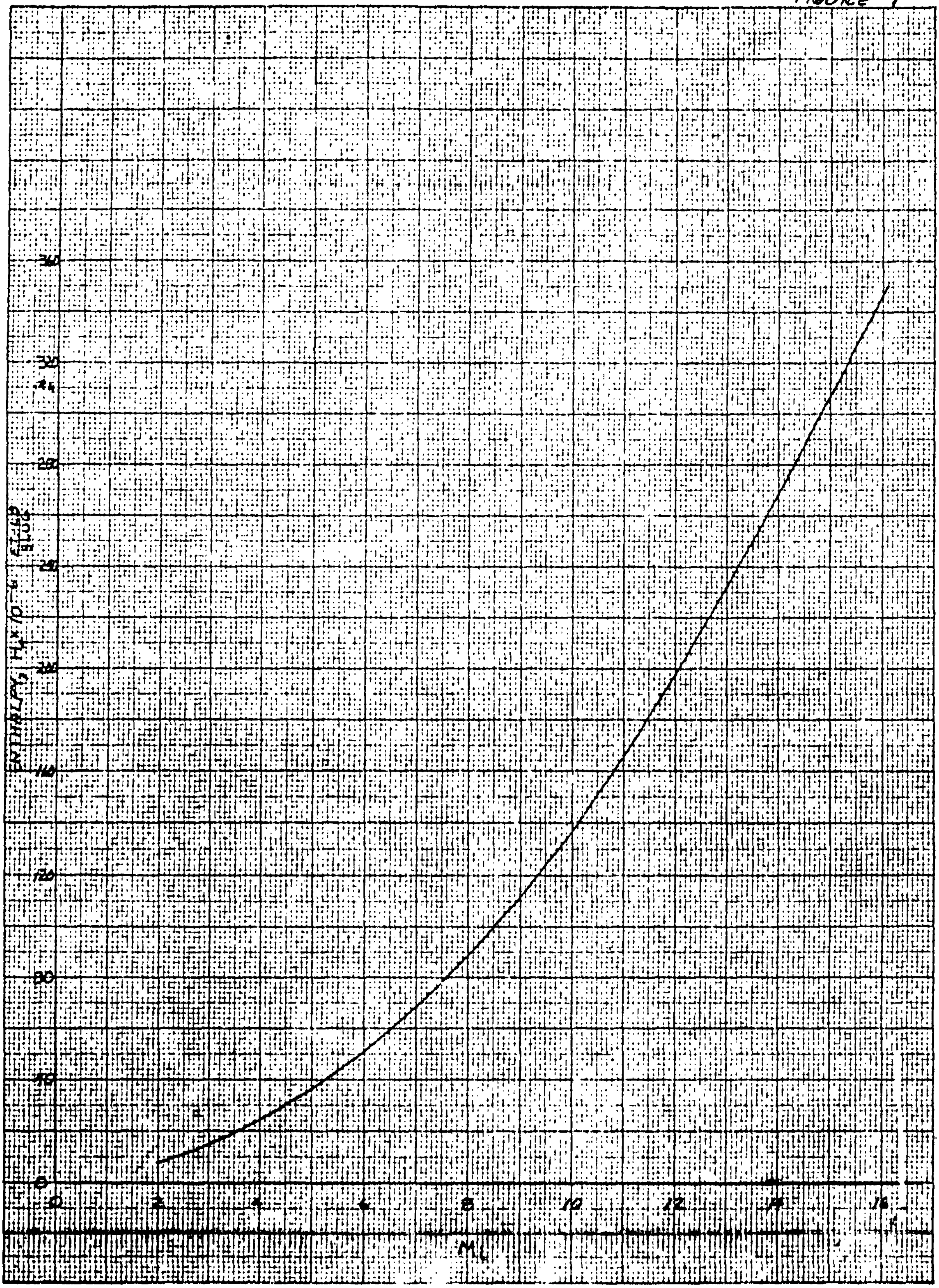
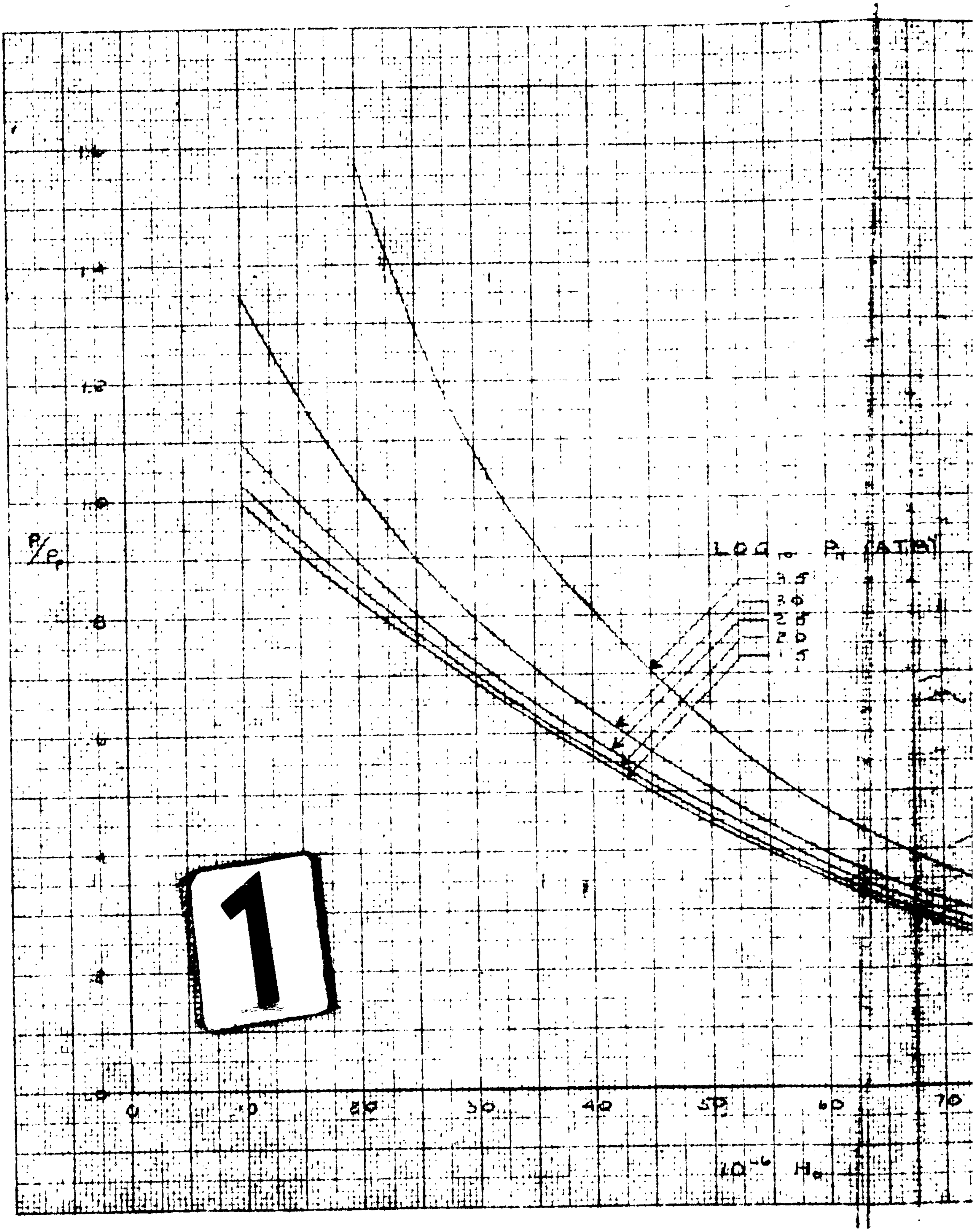
FIGURE 1

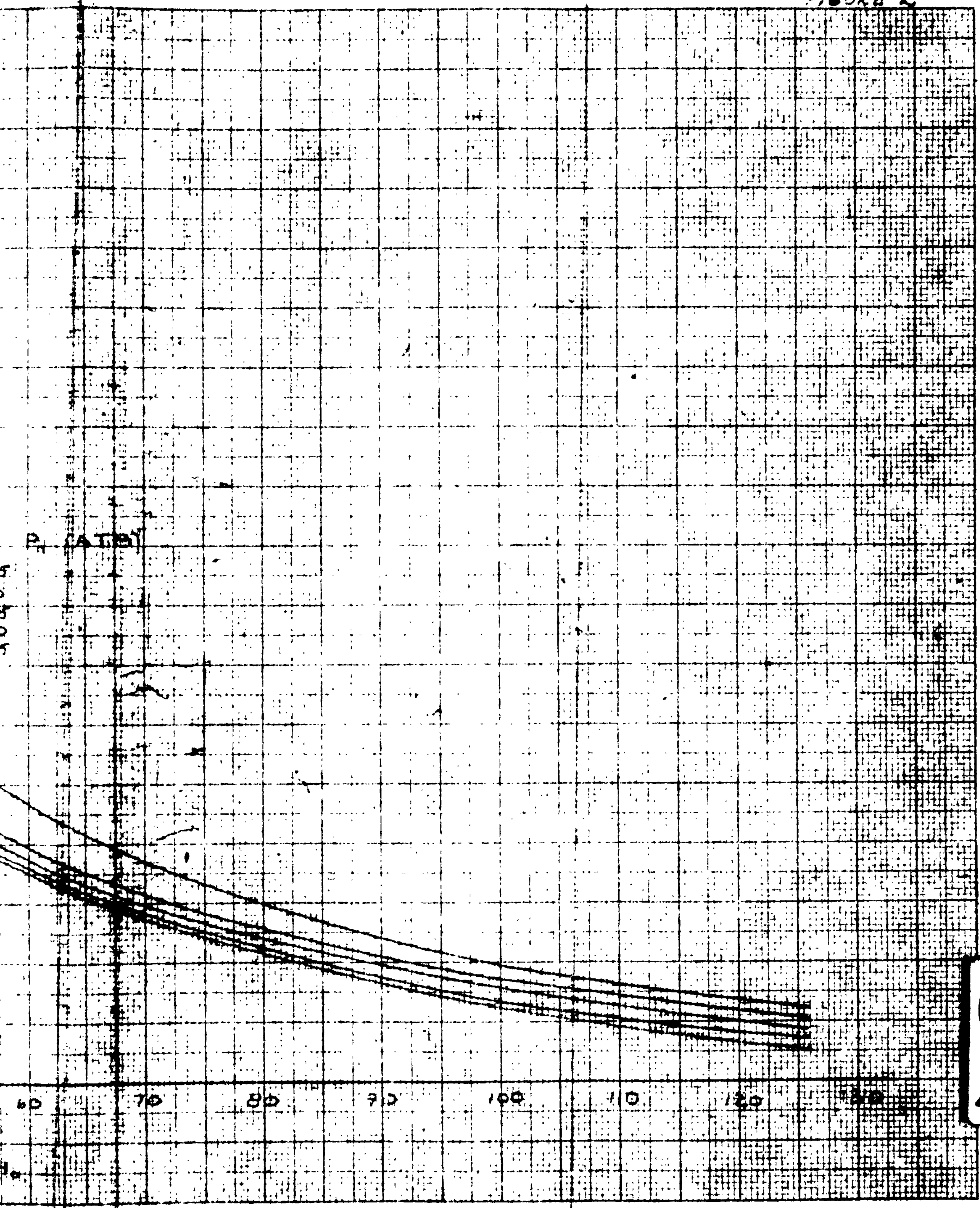


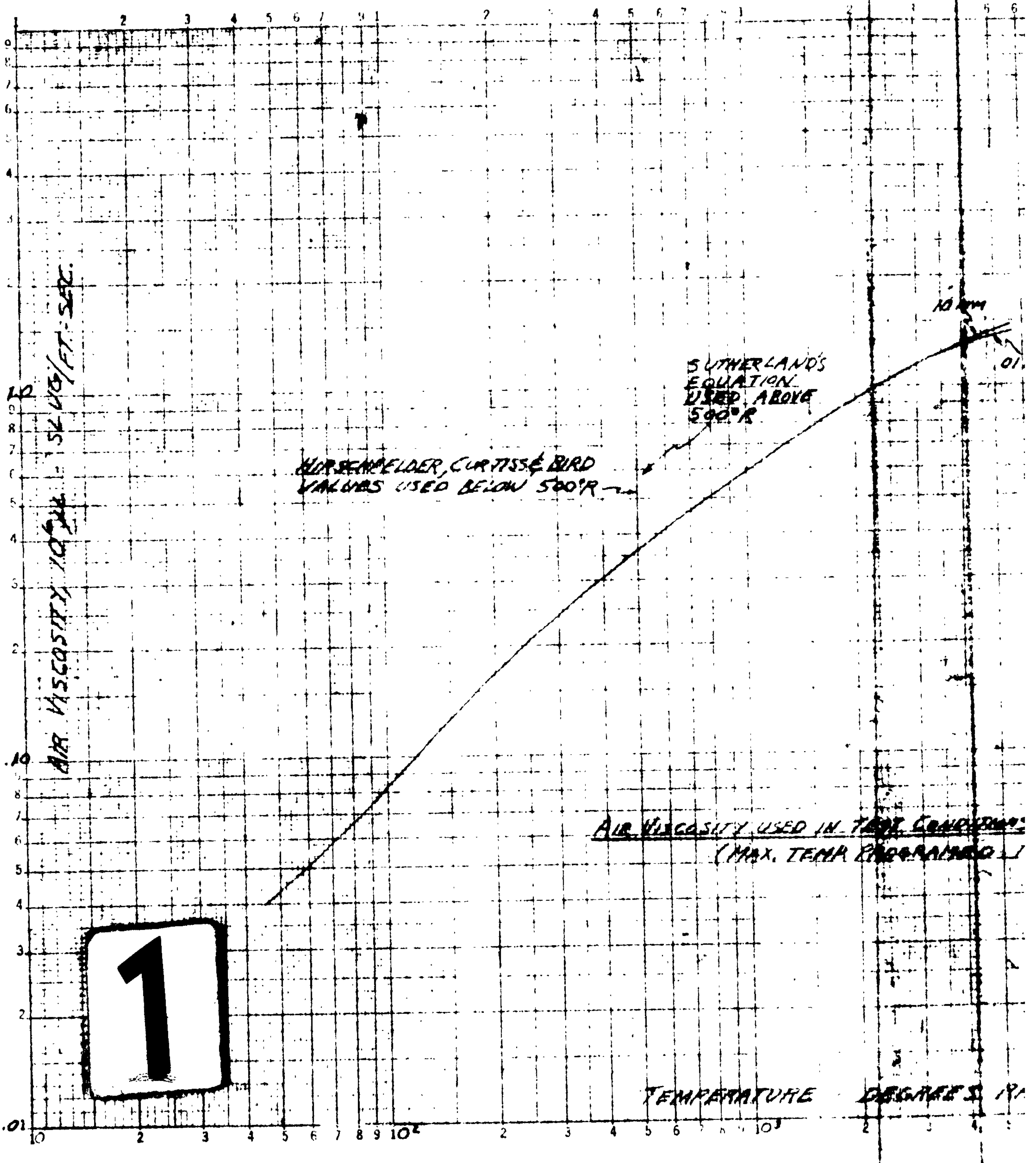
ENTHALPY, $H_t \times 10^{-6}$ FT-LB/SLUG
0
40
80
120
160
200
240
280
320
360
0
2
4
6
8
10
12
14
16
M_L



P/P_f
LOG10 P_f (ATM)
1.2
1.0
.8
.6
.4
.2
0
0
10
20
30
40
50
60
70
10^-6 H_0

FIGURE 2





K+E LOGARITHMIC 359-125L KEUFFEL & ESSER CO.

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FIGURE 3

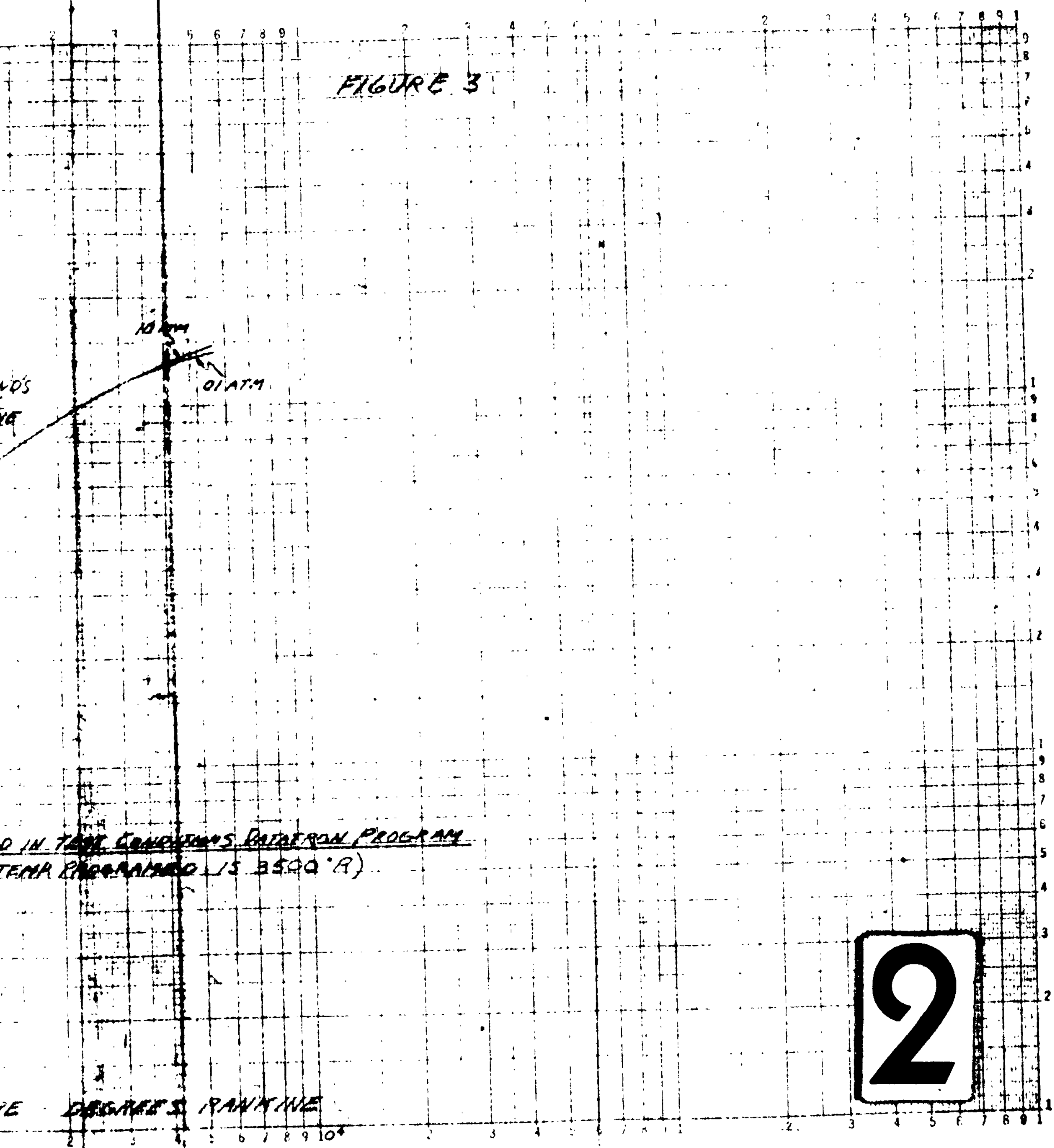


FIGURE 3
10 ATM
.01 ATM
D IN TEST CONDITIONS DATATRON PROGRAM
TEMP PROGRAMMED IS 3500 °R)
DEGREES RANKINE

FIGURE 4

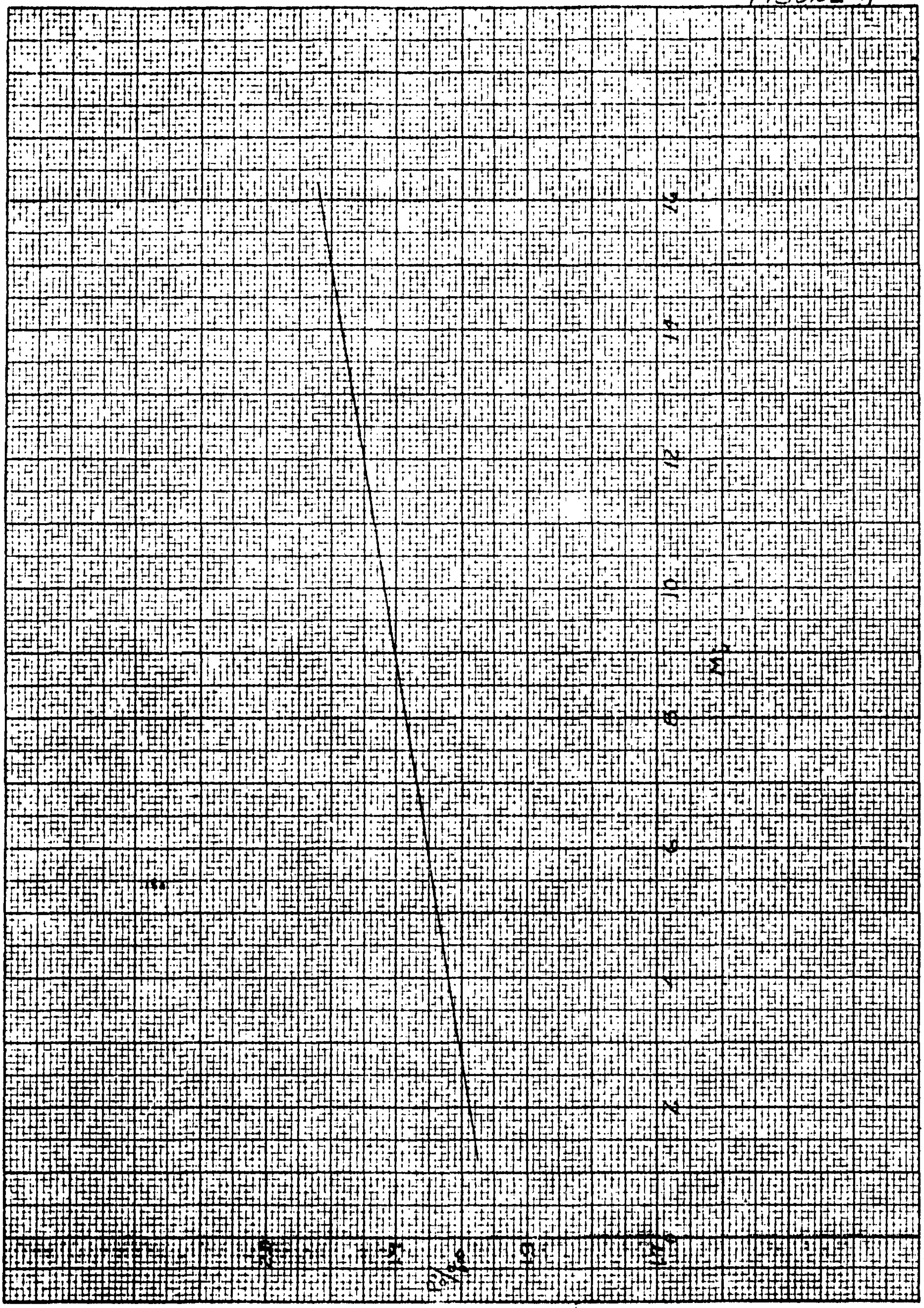


FIGURE 5.

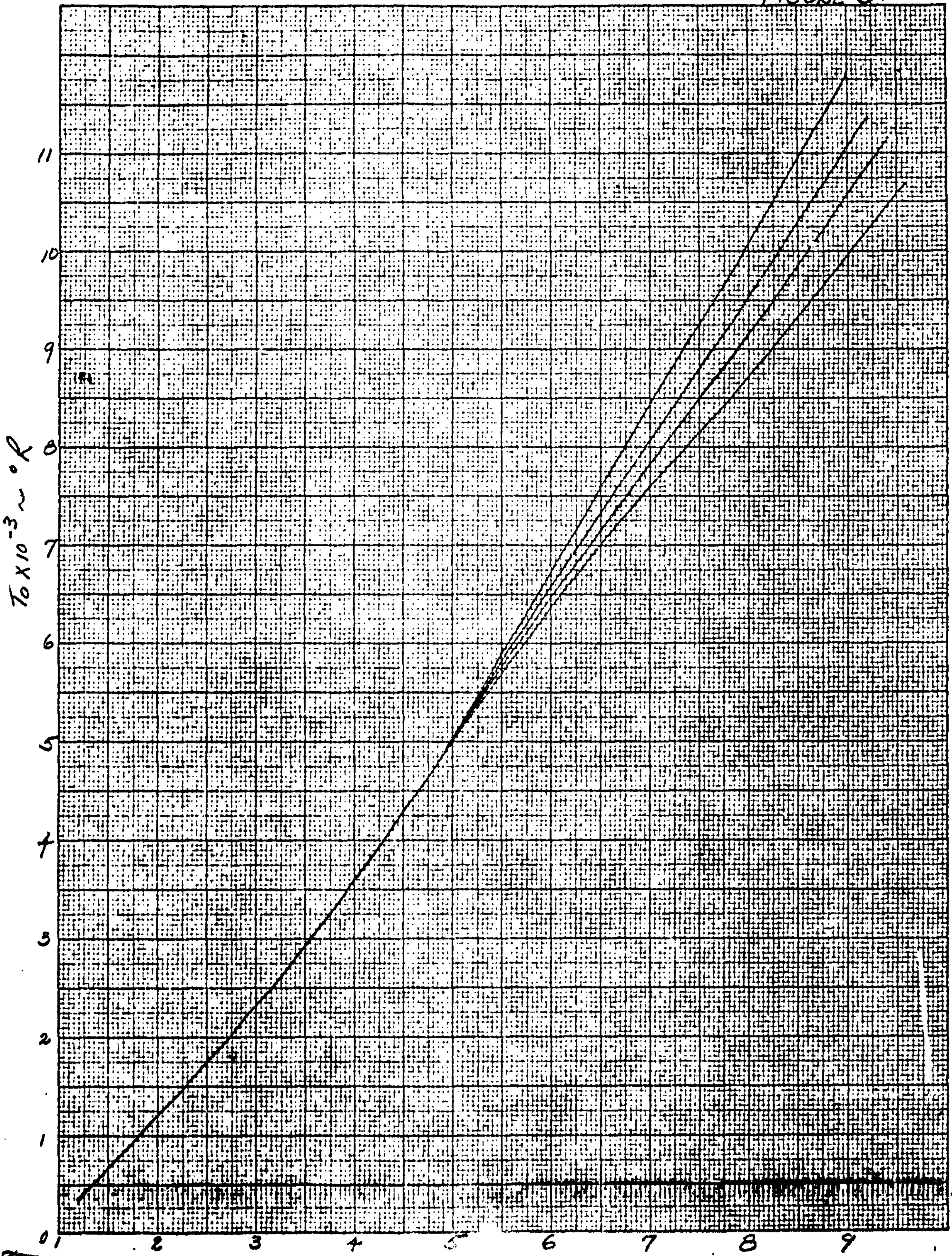


FIGURE 6

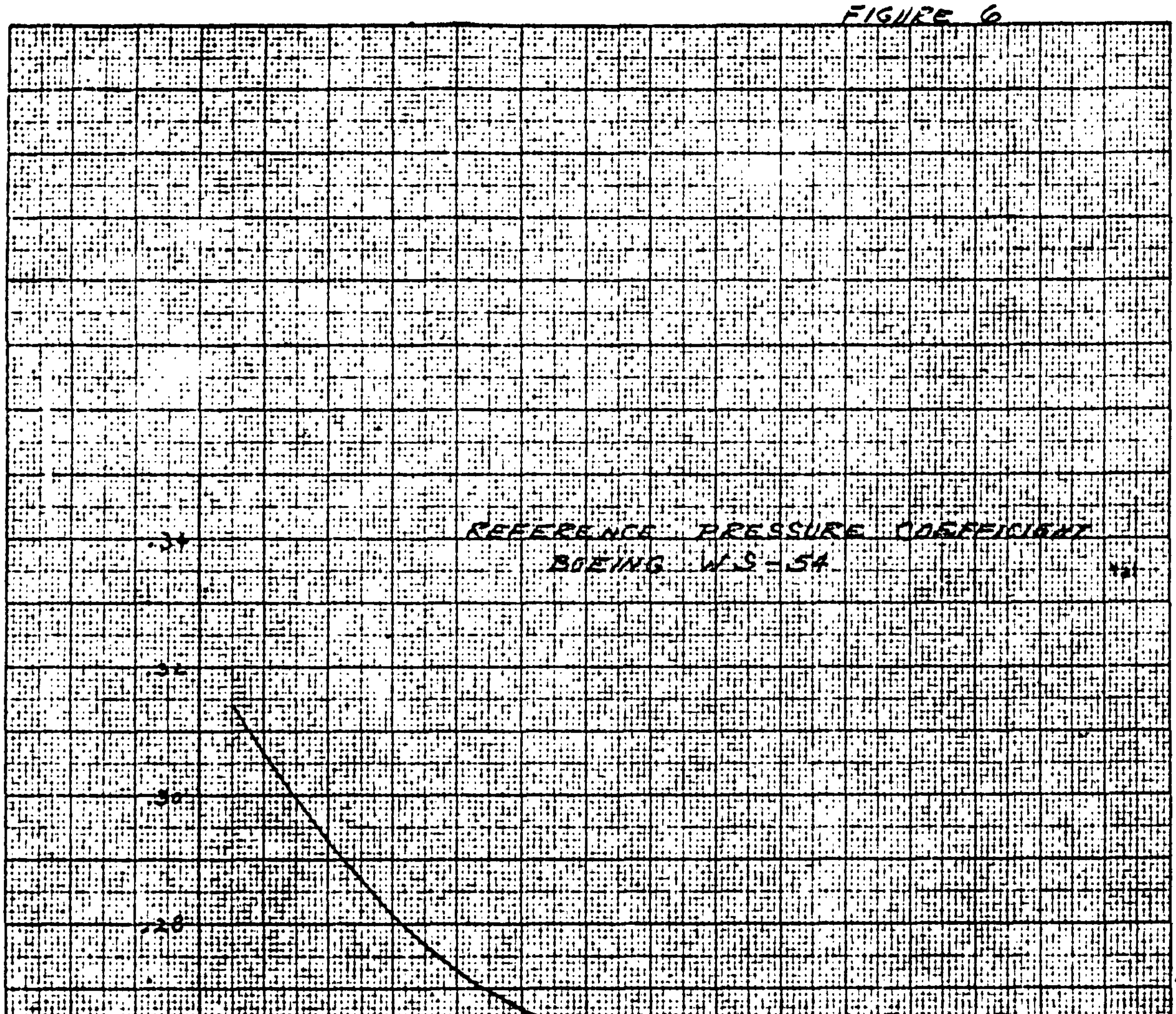
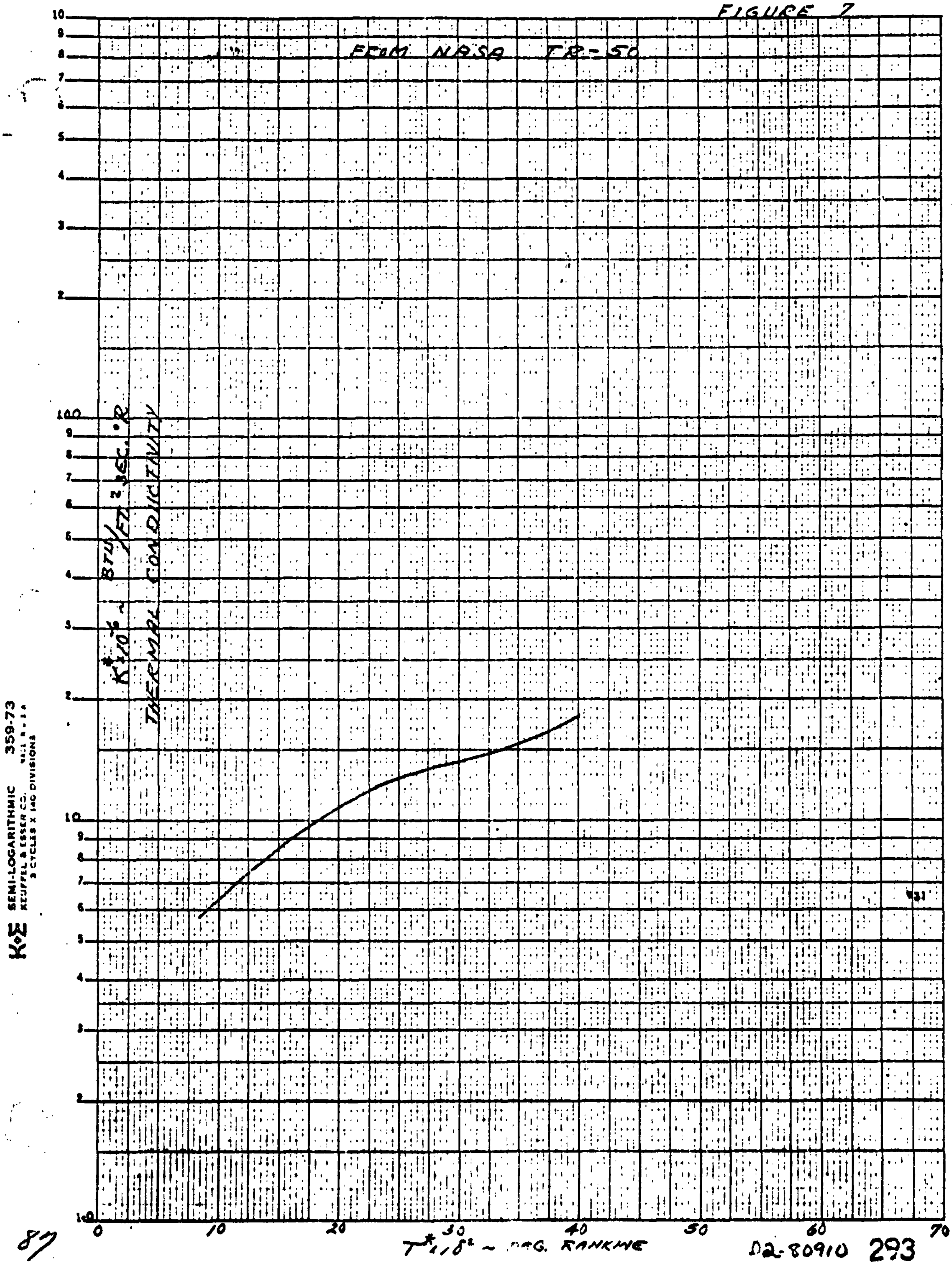

REFERENCE PRESSURE COEFFICIENT
BOEING WS-54
.32
.30
.28
.26
.24
.22
.20
4
6
8
10
12
14
16
18
MACH NO.

FIGURE 7



FROM NASA TR-50
K* x 10^6 ~ BTU/FT^2 SEC. °R
THERMAL CONDUCTIVITY
T* x 10^2 ~ DEG. RANKINE
0
10
20
30
40
50
60
70
K&E SEMI-LOGARITHMIC 359-73
KEUFFEL & ESSER CO.
3 CYCLES X 140 DIVISIONS

CORNELL AERONAUTICAL LABORATORY, INC.
BUFFALO 21, NEW YORK

ADDENDUM TO REPORT NO. AA-1661-Y-1

TURBULENT REFERENCE, ROUGHNESS, LEAKAGE AND DEFLECTED-SURFACE HEAT TRANSFER AND PRESSURE TESTS FOR THE BOEING COMPANY CONDUCTED IN THE CAL 48-INCH HYPERSONIC SHOCK TUNNEL

21 DECEMBER 1962
PROJECT NO. AA-1661-Y
CONTRACT NO. P.O. 2-045546-8155

BY R. K. Ellison
R. K. Ellison

APPROVED J. F. Martin DATE 1/2/63
J. F. Martin

APPROVED K.D. Bird DATE 1/3/63
K.D. Bird

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SUMMARY

This addendum presents the results of Runs 91 through 105 conducted for the Boeing Airplane Company by the Cornell Aeronautical Laboratory on Contract No. P.O. 2-045546-9155. These runs were made in the CAL 48" Hypersonic Shock Tunnel during August and November 1962.

Because of scheduling problems, nine runs of the original contracted test program, which was conducted during March 1962, had to be run during August 1962. After running Runs 91--93, the model was removed to replace faulty pressure transducers. Runs 94--99 were then run to complete the test. Subsequent inspection of the schlieren photographs showed that a shock wave was present which originated in the vicinity of the leading edge attachment to the main plate. These shocks may be seen in Figs. 49 through 50. It was determined that the gap between the two model parts was not sealed and the runs were rerun as Runs 100--105. Figs. 54 and 55 show that the shock had been eliminated during these runs by sealing the gap with model wax. Pressure and heat transfer data with and without the shock present are compared in Figs. 39, 40 and 42.

Table I is the test log; Table II lists the test conditions. The resulting data are tabulated in Tables III and IV and plotted in Figs. 38 to 46.

TABLE I
TEST LOG

Nozzle Throat	Run	Configuration	α	M_∞	T_o °R	P_o psi	R_N/ft x 10^{-6}	$\frac{T_o'}{T_o}$
A - 2.57	91	Sharp Plate	-15°	6.20	3010	3581	7.087	1.00
	92		-15°	5.62	5870	3634	2.139	.98
	93		-20°	6.19	3020	3581	6.991	1.00
	94		-15°	6.19	3020	3586	7.001	
	95		-15°	5.61	5860	3520	2.083	
	96		-25°	6.18	3070	3681	7.019	
	97	Blunt Plate	-15°	6.38	2090	3560	12.796	
	98		-15°	6.18	3080	3776	7.150	
	99		-15°	5.94	4220	3613	4.020	.98
	100	Sharp Plate	-15°	6.19	3040	3829	7.377	1.00
	101		-15°	5.61	5850	3875	2.275	
	102		-20°	6.18	3070	3810	7.278	
	103		-15°	5.61	5850	3859	2.249	
	104		-15°	6.38	2080	3937	14.389	
	105		-25°	6.18	3050	3964	7.652	

Note: On Runs 96--98 a gap was present between the leading attachment and the main body of the flat plate. This gap resulted in the formation of a shock wave as may be seen in Figs. 49 and 50.

TABLE IIa

TEST CONDITIONS

Run	M_∞	α	ψ	M_i	P_o	$H_o \times 10^{-6}$	q_∞	P_∞	$R_N/ft \times 10^{-6}$	P_o'
91	6.20	-15.00	.00	3.56	3581	20.2	44.0134	1.63570	7.087	81.7199
92	5.62	-15.00	.00	5.55	3634	44.8	39.9350	1.80627	2.139	74.8051
93	6.19	-20.00	.00	3.57	3581	20.3	43.7842	1.63244	6.991	81.2979
94	6.19	-15.00	.00	3.57	3586	20.3	43.8497	1.63489	7.001	81.4196
95	5.61	-15.00	.00	5.54	3520	44.7	38.8099	1.76165	2.083	72.6944
96	6.18	-25.00	.00	3.61	3681	20.7	45.1780	1.68987	7.019	83.9009
97	6.38	-15.00	.00	2.81	3560	13.6	44.1882	1.55084	12.796	81.7701
98	6.18	-15.00	.00	3.62	3776	20.8	46.3111	1.73225	7.150	86.0090
99	5.94	-15.00	.00	4.45	3613	30.0	43.3305	1.75438	4.020	80.7711
100	6.19	-15.00	.00	3.59	3829	20.5	46.7920	1.74459	7.377	86.8905
101	5.61	-15.00	.00	5.54	3875	44.7	42.3724	1.92336	2.275	79.3674
102	6.18	-20.00	.00	3.61	3810	20.7	46.8459	1.75225	7.278	86.9984
103	5.61	-15.00	.00	5.55	3859	44.8	42.0547	1.90893	2.249	78.7757
104	6.38	-15.00	.00	2.80	3937	13.5	49.2762	1.72941	14.389	91.1814
105	6.18	-25.00	.00	3.60	3964	20.6	48.9441	1.83073	7.652	90.8909

TABLE IIb

TEST CONDITIONS

Run	M_∞	α	ψ	U_∞	ρ_∞	$T_\infty \sim °R$	$T_o \sim °R$
91	6.20	-15.00	.00	5978	387.0	354.6834	3010
92	5.62	-15.00	.00	8798	1020.2	148.5794	5870
93	6.19	-20.00	.00	5991	390.0	351.2469	3020
94	6.19	-15.00	.00	5991	390.0	351.7726	3020
95	5.61	-15.00	.00	8781	1020.0	144.9429	5860
96	6.18	-25.00	.00	6049	398.8	355.5840	3070
97	6.38	-15.00	.00	4913	246.8	527.2580	2090
98	6.18	-15.00	.00	6063	400.8	362.7448	3080
99	5.94	-15.00	.00	7250	620.2	237.4018	4220
100	6.19	-15.00	.00	6021	393.8	371.7373	3040
101	5.61	-15.00	.00	8781	1020.0	158.2480	5850
102	6.18	-20.00	.00	6049	398.8	368.7118	3070
103	5.61	-15.00	.00	8795	1023.4	156.5422	5850
104	6.38	-15.00	.00	4898	245.4	591.4574	2080
105	6.18	-25.00	.00	6034	396.9	387.0962	3050

TABLE III
PRESSURE DATA

Run	M_∞	α	ψ	Press. No.	P_M	$\frac{PM}{P_\infty}$	$C_p = \frac{PM - P_\infty}{q_\infty}$	$\frac{PM}{Po'}$	$\bar{\chi} \times 10^3$
91	6.20	-15.00	.00	2	10.9441	6.6908	.2115	.1339	175
				3	8.0780	4.9386	.1464	.0989	145
				6	7.1467	4.3692	.1252	.0875	104
				7	10.1994	6.2355	.1946	.1248	97
				8	10.6317	6.4998	.2044	.1301	92
				9	10.5581	6.4548	.2027	.1292	88
				10	10.9952	6.7220	.2127	.1345	84
				11	10.5651	6.4591	.2029	.1293	82
				12	9.7964	5.9891	.1854	.1199	88
				13	7.9929	4.8866	.1444	.0978	88
				14	6.7446	4.1233	.1161	.0825	88
92	5.62	-15.00	.00	1	4.4117	2.4424	.0652	.0590	341
				3	7.8727	4.3585	.1519	.1052	207
				4	5.5691	3.0832	.0942	.0744	181
				6	6.7613	3.7432	.1241	.0904	149
				7	10.4259	5.7721	.2158	.1394	138
				8	11.6026	6.4235	.2453	.1551	131
				9	10.9798	6.0787	.2297	.1468	126
				10	11.4442	6.3358	.2413	.1530	120
				11	11.6561	6.4532	.2466	.1558	117
				12	10.9529	6.0639	.2290	.1464	126
				13	9.0286	4.9985	.1809	.1207	126
				14	7.1098	3.9362	.1328	.0950	126
93	6.19	-20.00	.00	1	11.15[illegible]4	6.8318	.2174	.1372	239
				2	1.9402	1.1885	.0070	.0239	176
				3	12.4370	7.6186	.2468	.1530	145
				4	14.2493	8.7288	.2882	.1753	127
				5	5.2516	3.2170	.0827	.0646	114
				6	11.7320	7.1868	.2307	.1443	104
				7	15.3408	9.3974	.3131	.1887	97
				8	16.5035	10.1097	.3396	.2030	92
				9	15.7005	9.6178	.3213	.1931	88
				10	15.5376	9.5180	.3176	.1911	84
				11	14.6045	8.9464	.2963	.1796	82
				12	14.2669	8.7396	.2886	.1755	88.
				13	12.0153	7.3603	.2371	.1478	88.
				14	10.2855	6.3007	.1976	.1265	88.
94	6.19	-15.00	.00	1	10.4958	6.4199	.2021	.1289	239.

TABLE III

PRESSURE DATA

Run	M_∞	α	ψ	Press. No.	PM	$\frac{PM}{P_\infty}$	$C_p = \frac{PM - P_\infty}{q_\infty}$	$\frac{PM}{P_o'}$	$\bar{X} \times 10^3$
94	6.19	-15.00	.00	2	10.1405	6.2026	.1940	.1245	176.
				3	10.1871	6.2311	.1950	.1251	145.
				4	9.5753	5.8569	.1811	.1176	127.
				5	13.0644	7.9910	.2607	.1605	114
				6	10.1717	6.2217	.1947	.1249	104
				7	10.5294	6.4405	.2028	.1293	97
				8	10.2152	6.2482	.1957	.1255	92
				9	10.1271	6.1944	.1937	.1244	88
				10	10.2406	6.2638	.1963	.1258	84
				11	10.0732	6.1614	.1924	.1237	82
				12	9.1940	5.6237	.1724	.1129	88
				13	7.7121	4.7172	.1386	.0947	88
				14	6.3958	3.8754	.1072	.0778	88
95	5.61	-15.00	.00	1	11.8407	6.7214	.2597	.1629	343
				2	10.5467	5.9868	.2264	.1451	253
				3	10.1448	5.7587	.2160	.1396	209
				4	8.9931	5.1049	.1863	.1237	182
				5	14.8160	8.4103	.3364	.2038	164
				6	11.8731	6.7397	.2605	.1633	150
				7	9.7660	5.5437	.2062	.1343	139
				8	10.7537	6.1043	.2317	.1479	132
				9	10.6925	6.0696	.2301	.1471	127
				10	11.0496	6.2723	.2393	.1520	121
				11	10.8028	6.1322	.2330	.1486	118
				12	9.3967	5.3341	.1967	.1293	127
				13	7.8995	4.4842	.1582	.1087	127
				14	6.5927	3.7424	.1245	.0907	127
96	6.18	-25.00	.00	1	31.6466	18.7273	.6631	.3772	237
				2	24.2755	14.3653	.4999	.2893	175.
				3	23.8934	14.1392	.4915	.2848	144.
				4	24.1677	14.3016	.4975	.2881	126.
				5	31.0160	18.3541	.6491	.3697	113.
				6	27.5392	16.2967	.5722	.3282	104.
				7	21.2919	12.5998	.4339	.2538	96.
				8	21.9605	12.9954	.4487	.2617	91.
				9	20.0970	11.8927	.4074	.2395	87.
				11	19.0820	11.2920	.3850	.2274	82.
				13	17.0193	10.0714	.3393	.2029	87.
				14	15.3464	9.0814	.3023	.1829	87.

TABLE III
PRESSURE DATA

Run	M_∞	α	ψ	Press. No.	P_M	$\frac{P_M}{P_\infty}$	$C_p = \frac{P_M - P_\infty}{q_\infty}$	$\frac{P_M}{P_o'}$	$\bar{X}$
97	6.38	-15.00	.00	2	13.1908	8.5056	.2634	.1613	142
				3	12.0578	7.7750	.2378	.1475	118
				4	10.6921	6.8944	.2069	.1308	103
				5	12.9381	8.3427	.2577	.1582	92
				6	10.7726	6.9463	.2087	.1317	84
				7	9.3998	6.0611	.1776	.1150	78
				9	8.8078	5.6794	.1642	.1077	71
				11	8.6140	5.5544	.1598	.1053	66
				13	7.5140	4.8451	.1349	.0919	71
				14	6.5198	4.2040	.1124	.0797	71
98	6.18	-15.00	.00	2	13.2576	7.6534	.2489	.1541	173
				3	11.2574	6.4987	.2057	.1309	143
				4	10.1878	5.8813	.1826	.1185	125
				6	10.7175	6.1870	.1940	.1246	103
				7	9.0101	5.2014	.1572	.1048	95
				8	9.0983	5.2523	.1591	.1058	91
				9	8.3218	4.8041	.1423	.0968	87
				10	7.5654	4.3674	.1260	.0880	83
				11	8.4521	4.8793	.1451	.0983	81
				12	7.7712	4.4862	.1304	.0904	87
				13	8.0098	4.6239	.1356	.0931	87
				14	6.0384	3.4858	.0930	.0702	87
99	5.94	-15.00	.00	2	14.1320	8.0553	.2857	.1750	209
				3	12.1720	6.9381	.2404	.1507	173
				4	11.0368	6.2910	.2142	.1366	151
				6	11.1388	6.3491	.2166	.1379	124
				7	9.1646	5.2239	.1710	.1135	115
				8	9.1833	5.2345	.1714	.1137	110
				9	8.5111	4.8514	.1559	.1054	105
				10	7.0659	4.0276	.1226	.0875	100
				11	8.4352	4.8081	.1542	.1044	98
				12	7.5769	4.3188	.1344	.0938	105
				13	7.7337	4.4082	.1380	.0957	105
				14	5.8467	3.3326	.0944	.0724	105

TABLE III
PRESSURE DATA

Run	M_∞	α	ψ	Press. No.	P_M	$\frac{P_M}{P_\infty}$	$C_p = \frac{P_M - P_\infty}{q_\infty}$	$\frac{P_M}{P_o}$	$\bar{X}$
100	6.19	15.00	.00	1	11.3192	6.4882	.2046	.1303	232
				2	13.1162	7.5182	.2430	.1510	171
				3	14.1117	8.0889	.2643	.1624	142
				4	12.8769	7.3811	.2379	.1482	123
				5	12.0741	6.9209	.2208	.1390	111
				6	12.0462	6.9049	.2202	.1386	101
				7	10.8462	6.2171	.1945	.1248	94
				8	10.8312	6.2085	.1942	.1247	90
				9	11.2164	6.4293	.2024	.1291	86
				10	9.9219	5.6872	.1748	.1142	82
				11	11.0638	6.3418	.1992	.1273	80
				12	9.6771	5.5469	.1695	.1114	86
				13	8.6678	4.9684	.1480	.0998	86
				14	6.6634	3.8195	.1051	.0767	86
101	5.61	15.00	.00	1	11.5488	6.0045	.2272	.1455	329
				2	12.7855	6.6475	.2564	.1611	242
				3	14.4556	7.5158	.2958	.1821	200
				4	12.5802	6.5407	.2515	.1585	175
				5	11.5398	5.9998	.2270	.1454	157
				6	12.2678	6.3783	.2441	.1546	143
				7	10.4281	5.4218	.2007	.1314	133
				8	10.8332	5.6326	.2103	.1365	127
				9	11.4385	5.9472	.2246	.1441	121
				10	10.1269	5.2652	.1936	.1276	116
				11	11.0638	5.7523	.2157	.1394	113
				12	11.1071	5.7749	.2167	.1399	121
				13	8.9298	4.6428	.1654	.1125	121
				14	6.8520	3.5625	.1163	.0863	121
102	6.18	20.00	.00	1	20.7107	11.8195	.4047	.2381	233
				2	19.5762	11.1720	.3805	.2250	171
				3	21.2822	12.1456	.4169	.2446	142
				4	20.2019	11.5291	.3938	.2322	124
				5	17.9941	10.2691	.3467	.2068	111
				6	18.6753	10.6579	.3612	.2147	102
				7	16.4476	9.3865	.3137	.1891	94
				8	16.2146	9.2535	.3087	.1864	90
				9	16.7422	9.5547	.3200	.1924	86
				10	14.8084	8.4510	.2787	.1702	82
				11	15.9694	9.1136	.3035	.1836	80

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TABLE III
PRESSURE DATA

Run	M_∞	α	ψ	Press. No.	P_M	$\frac{P_M}{P_\infty}$	$C_p = \frac{PM - P_\infty}{q_\infty}$	$\frac{PM}{Po^1}$	$\bar{X}$
102	6.18	20.00	.00	12	14.2966	8.1590	.2678	.1643	86
				13	33.6494	19.2035	.6809	.3868	86
				14	5.8272	3.3255	.0870	.0670	86
103	5.61	15.00	.00	1	11.6396	6.0974	.2314	.1478	331
				2	12.7509	6.6796	.2578	.1619	243
				3	13.1986	6.9141	.2685	.1675	201
				4	12.6850	6.6451	.2562	.1610	176
				5	11.3231	5.9316	.2239	.1437	158
				6	12.3476	6.4683	.2482	.1567	144
				7	10.2053	5.3461	.1973	.1295	134
				8	10.7239	5.6178	.2096	.1361	128
				9	10.7808	5.6476	.2110	.1369	122
				10	9.6701	5.0657	.1845	.1228	117
				11	10.4255	5.4614	.2025	.1323	114
				12	9.4445	4.9476	.1792	.1199	122
				13	9.3357	4.8905	.1766	.1185	122
				14	6.7880	3.5559	.1160	.0862	122
104	6.38	15.00	.00	1	13.9622	8.0734	.2483	.1531	182
				2	13.4849	7.7974	.2386	.1479	134
				3	13.8696	8.0199	.2464	.1521	111
				4	12.9746	7.5024	.2282	.1423	97
				5	11.8231	6.8365	.2048	.1297	87
				6	11.3988	6.5912	.1962	.1250	79
				7	10.7196	6.1984	.1824	.1176	74
				8	22.3395	12.9174	.4183	.2450	70
105	6.18	25.00	.00	1	31.1315	17.0049	.5987	.3425	227
				2	27.9411	15.2623	.5335	.3074	167
				3	30.7730	16.8091	.5913	.3386	138
				4	28.5712	15.6064	.5463	.3143	121
				5	24.5157	13.3912	.4635	.2697	108
				6	27.7026	15.1320	.5286	.3048	99
				7	21.8118	11.9143	.4082	.2400	92
				9	21.7554	11.8834	.4071	.2394	84
				10	20.0983	10.9783	.3732	.2211	80
				11	20.8704	11.4000	.3890	.2296	78
				12	20.4819	11.1878	.3811	.2253	84
				13	19.1270	10.4477	.3534	.2104	84
				14	15.1595	8.2806	.2723	.1668	84

TABLE IV

HEAT TRANSFER DATA

Run	Gage No.	M_∞		α	ψ	$\dot q$	$\dot q / \dot q_o$	$\dot q / \dot q_{REF}$	$\dot q / (H_o - H_w) \times 10^6$	$C_H \times 10^3$	$C_H \sqrt{R_{N\,T_t}}$	$\dot q_o$	$\dot q_{REF}$
91	1	6.20	-	15.00	.00	43.70	.0983	10.419	2.570	.943	.864	444.64	4.19
91	2	6.20	-	15.00	.00	75.17	.1691	17.923	4.421	1.622	2.018	444.64	4.19
91	3	6.20	-	15.00	.00	135.54	.3048	32.315	7.972	2.925	4.393	444.64	4.19
91	4	6.20	-	15.00	.00	108.93	.2450	25.970	6.407	2.351	4.047	444.64	4.19
91	5	6.20	-	15.00	.00	114.76	.2581	27.359	6.750	2.476	4.746	444.64	4.19
91	6	6.20	-	15.00	.00	106.88	.2404	25.483	6.287	2.307	4.828	444.64	4.19
91	7	6.20	-	15.00	.00	115.19	.2591	27.463	6.775	2.486	5.602	444.64	4.19
91	8	6.20	-	15.00	.00	109.93	.2472	26.209	6.466	2.372	5.619	444.64	4.19
91	9	6.20	-	15.00	.00	104.10	.2341	24.818	6.123	2.246	5.567	444.64	4.19
91	10	6.20	-	15.00	.00	98.84	.2223	23.565	5.813	2.133	5.510	444.64	4.19
91	11	6.20	-	15.00	.00	100.22	.2254	23.893	5.894	2.163	5.742	444.64	4.19
91	12	6.20	-	15.00	.00	101.59	.2285	24.220	5.975	2.192	5.433	444.64	4.19
91	13	6.20	-	15.00	.00	99.59	.2240	23.743	5.857	2.149	5.326	444.64	4.19
91	14	6.20	-	15.00	.00	79.27	.1783	18.900	4.663	1.711	4.240	444.64	4.19
92	1	5.62	-	15.00	.00	91.35	.0851	10.195	2.196	1.307	.658	73.82	8.96
92	2	5.62	-	15.00	.00	123.04	.1146	13.731	2.958	1.761	1.203	73.82	8.96
92	3	5.62	-	15.00	.00	227.38	.2117	25.375	5.466	3.254	2.685	73.82	8.96
92	4	5.62	-	15.00	.00	257.64	.2399	28.753	6.193	3.687	3.488	73.82	8.96
92	5	5.62	-	15.00	.00	255.70	.2381	28.535	6.146	3.659	3.853	73.82	8.96
92	6	5.62	-	15.00	.00	242.05	.2254	27.012	5.818	3.464	3.983	73.82	8.96
92	7	5.62	-	15.00	.00	246.82	.2298	27.544	5.933	3.532	4.373	73.82	8.96
92	8	5.62	-	15.00	.00	225.99	.2105	25.220	5.432	3.234	4.208	73.82	8.96
92	9	5.62	-	15.00	.00	221.78	.2065	24.750	5.331	3.174	4.321	73.82	8.96
92	10	5.62	-	15.00	.00	208.31	.1940	23.246	5.007	2.981	4.231	73.82	8.96
92	11	5.62	-	15.00	.00	207.80	.1935	23.190	4.995	2.974	4.338	73.82	8.96
92	12	5.62	-	15.00	.00	219.98	.2049	24.549	5.288	3.148	4.286	73.82	8.96
92	13	5.62	-	15.00	.00	220.47	.2053	24.604	5.299	3.155	4.296	73.82	8.96
92	14	5.62	-	15.00	.00	173.86	.1619	19.403	4.179	2.488	3.388	73.82	8.96
93	1	6.19	-	20.00	.00	66.30	.1486	15.790	3.877	1.433	1.304	446.20	4.20
93	2	6.19	-	20.00	.00	190.78	.4276	45.438	11.155	4.125	5.096	446.20	4.20
93	3	6.19	-	20.00	.00	164.09	.3677	39.081	9.595	3.548	5.292	446.20	4.20
93	4	6.19	-	20.00	.00	149.26	.3345	35.548	8.727	3.227	5.518	446.20	4.20
93	5	6.19	-	20.00	.00	144.89	.3247	34.507	8.472	3.132	5.963	446.20	4.20
93	6	6.19	-	20.00	.00	140.22	.3143	33.396	8.199	3.032	6.303	446.20	4.20
93	7	6.19	-	20.00	.00	148.25	.3322	35.307	8.668	3.205	7.174	446.20	4.20
93	8	6.19	-	20.00	.00	141.03	.3161	33.588	8.246	3.049	7.173	446.20	4.20
93	9	6.19	-	20.00	.00	134.04	.3004	31.923	7.837	2.898	7.133	446.20	4.20

TABLE IV

HEAT TRANSFER DATA

Run	Gage No.	M_∞		α	ψ	$\dot{q}$	$\dot{q}/\dot{q}_o$	$\dot{q}/\dot{q}_{REF}$	$\dot{q}/(H_o-H_w) \times 10^6$	$C_H \times 10^3$	$C_H\sqrt{R_{N\infty x}}$	$\dot{q}_o$	$\dot{q}_{REF}$
93	10	6.19	-	20.00	.00	129.91	.2912	30.941	7.596	2.809	7.207	446.20	4.20
93	11	6.19	-	20.00	.00	123.23	.2762	29.348	7.205	2.664	7.026	446.20	4.20
93	12	6.19	-	20.00	.00	127.78	.2864	30.432	7.471	2.763	6.800	446.20	4.20
93	13	6.19	-	20.00	.00	126.10	.2826	30.032	7.373	2.726	6.711	446.20	4.20
93	14	6.19	-	20.00	.00	84.73	.1899	20.180	4.954	1.832	4.509	446.20	4.20
94	1	6.19	-	15.00	.00	132.03	.2957	31.407	7.720	2.851	2.595	446.54	4.20
94	2	6.19	-	15.00	.00	146.66	.3284	34.886	8.575	3.166	3.915	446.54	4.20
94	3	6.19	-	15.00	.00	120.01	.2688	28.548	7.017	2.591	3.868	446.54	4.20
94	4	6.19	-	15.00	.00	107.47	.2407	25.565	6.284	2.320	3.971	446.54	4.20
94	5	6.19	-	15.00	.00	105.21	.2356	25.025	6.152	2.271	4.327	446.54	4.20
94	6	6.19	-	15.00	.00	95.68	.2143	22.759	5.595	2.066	4.298	446.54	4.20
94	7	6.19	-	15.00	.00	102.41	.2293	24.361	5.988	2.211	4.953	446.54	4.20
94	8	6.19	-	15.00	.00	97.63	.2186	23.223	5.709	2.108	4.962	446.54	4.20
94	9	6.19	-	15.00	.00	96.95	.2171	23.061	5.669	2.093	5.156	446.54	4.20
94	10	6.19	-	15.00	.00	91.46	.2048	21.757	5.348	1.975	5.070	446.54	4.20
94	11	6.19	-	15.00	.00	92.11	.2063	21.911	5.386	1.989	5.248	446.54	4.20
94	12	6.19	-	15.00	.00	99.69	.2232	23.713	5.829	2.152	5.302	446.54	4.20
94	13	6.19	-	15.00	.00	95.78	.2145	22.783	5.600	2.068	5.094	446.54	4.20
94	14	6.19	-	15.00	.00	65.19	.1460	15.507	3.812	1.407	3.467	446.54	4.20
95	1	5.61	-	15.00	.00	104.00	.0984	11.923	2.506	1.532	.761	56.82	8.72
95	2	5.61	-	15.00	.00	277.45	.2625	31.810	6.685	4.087	2.756	56.82	8.72
95	3	5.61	-	15.00	.00	250.50	.2370	28.720	6.036	3.690	3.005	56.82	8.72
95	4	5.61	-	15.00	.00	220.00	.2082	25.223	5.301	3.241	3.025	56.82	8.72
95	5	5.61	-	15.00	.00	214.22	.2027	24.561	5.162	3.155	3.279	56.82	8.72
95	6	5.61	-	15.00	.00	206.30	.1952	23.652	4.971	3.039	3.449	56.82	8.72
95	7	5.61	-	15.00	.00	228.05	.2158	26.146	5.495	3.359	4.104	56.82	8.72
95	8	5.61	-	15.00	.00	199.63	.1889	22.888	4.810	2.941	3.776	56.82	8.72
95	9	5.61	-	15.00	.00	208.72	.1975	23.930	5.029	3.074	4.131	56.82	8.72
95	10	5.61	-	15.00	.00	188.07	.1780	21.562	4.531	2.770	3.880	56.82	8.72
95	11	5.61	-	15.00	.00	187.55	.1775	21.503	4.519	2.763	3.977	56.82	8.72
95	12	5.61	-	15.00	.00	200.55	.1898	22.993	4.832	2.954	3.969	56.82	8.72
95	13	5.61	-	15.00	.00	194.69	.1842	22.321	4.691	2.868	3.853	56.82	8.72
95	14	5.61	-	15.00	.00	140.36	.1328	16.092	3.382	2.068	2.778	56.82	8.72
96	1	6.18	-	25.00	.00	178.64	.3847	40.527	10.207	3.693	3.365	464.32	4.41
96	2	6.18	-	25.00	.00	242.99	.5233	55.124	13.883	5.023	6.218	464.32	4.41

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TABLE IV

HEAT TRANSFER DATA

Run	Gage No.	M_∞		α	ψ	$\dot{q}$	$\frac{\dot{q}}{\dot{q}_o}$	$\frac{\dot{q}}{\dot{q}_{REF}}$	$\frac{\dot{q}}{(H_o - H_w)} \times 10^6$	$C_H \times 10^3$	$C_H\sqrt{\frac{R_x}{N...}}$	$\dot{q}_o$	$\dot{q}_{REF}$
96	3	6.18	-	25.00	.00	191.73	.4129	43.497	10.955	3.963	5.924	464.32	4.41
96	4	6.18	-	25.00	.00	234.00	.5040	53.086	13.370	4.837	8.288	464.32	4.41
96	5	6.18	-	25.00	.00	171.61	.3696	38.932	9.805	3.547	6.766	464.32	4.41
96	6	6.18	-	25.00	.00	165.84	.3572	37.623	9.476	3.428	7.141	464.32	4.41
96	7	6.18	-	25.00	.00	167.37	.3605	37.970	9.563	3.460	7.759	464.32	4.41
96	8	6.18	-	25.00	.00	152.21	.3278	34.530	8.697	3.146	7.416	464.32	4.41
96	9	6.18	-	25.00	.00	148.29	.3194	33.641	8.473	3.065	7.560	464.32	4.41
96	10	6.18	-	25.00	.00	143.01	.3080	32.442	8.171	2.956	7.599	464.32	4.41
96	11	6.18	-	25.00	.00	148.56	.3199	33.702	8.488	3.071	8.114	464.32	4.41
96	12	6.18	-	25.00	.00	138.23	.2977	31.359	7.898	2.857	7.047	464.32	4.41
96	13	6.18	-	25.00	.00	151.84	.3270	34.448	8.676	3.139	7.741	464.32	4.41
96	14	6.18	-	25.00	.00	103.91	.2238	23.574	5.937	2.148	5.298	464.32	4.41
97	2	6.38	-	15.00	.00	80.68	.3031	30.715	7.756	2.829	3.893	266.14	2.63
97	3	6.38	-	15.00	.00	69.09	.2596	26.301	6.642	1.994	4.025	266.14	2.63
97	4	6.38	-	15.00	.00	59.91	.2251	22.809	5.760	1.730	4.002	266.14	2.63
97	5	6.38	-	15.00	.00	54.42	.2045	20.719	5.232	1.571	4.046	266.14	2.63
97	6	6.38	-	15.00	.00	51.03	.1917	19.428	4.906	1.473	4.144	266.14	2.63
97	7	6.38	-	15.00	.00	52.48	.1972	19.981	5.045	1.515	4.588	266.14	2.63
97	8	6.38	-	15.00	.00	47.28	.1777	18.001	4.546	1.365	4.345	266.14	2.63
97	11	6.38	-	15.00	.00	43.58	.1637	16.591	4.190	1.258	4.489	266.14	2.63
97	12	6.38	-	15.00	.00	47.11	.1770	17.936	4.529	1.360	4.529	266.14	2.63
97	13	6.38	-	15.00	.00	45.20	.1698	17.208	4.345	1.305	4.346	266.14	2.63
97	14	6.38	-	15.00	.00	35.78	.1344	13.621	3.440	1.033	3.440	266.14	2.63
98	2	6.18	-	15.00	.00	56.67	.1198	12.526	3.220	1.139	1.423	472.92	4.52
98	3	6.18	-	15.00	.00	75.30	.1592	16.644	4.278	1.514	2.283	472.92	4.52
98	4	6.18	-	15.00	.00	92.26	.1951	20.393	5.242	1.854	3.207	472.92	4.52
98	5	6.18	-	15.00	.00	87.89	.1858	19.425	4.993	1.766	3.401	472.92	4.52
98	6	6.18	-	15.00	.00	81.00	.1713	17.903	4.602	1.628	3.423	472.92	4.52
98	8	6.18	-	15.00	.00	75.37	.1594	16.658	4.282	1.515	3.604	472.92	4.52
98	9	6.18	-	15.00	.00	72.79	.1539	16.089	4.135	1.463	3.642	472.92	4.52
98	10	6.18	-	15.00	.00	69.88	.1478	15.444	3.970	1.404	3.644	472.92	4.52
98	11	6.18	-	15.00	.00	68.81	.1455	15.208	3.909	1.383	3.688	472.92	4.52
98	12	6.18	-	15.00	.00	77.58	.1640	17.147	4.407	1.559	3.882	472.92	4.52
98	13	6.18	-	15.00	.00	68.48	.1448	15.135	3.890	1.376	3.426	472.92	4.52
98	14	6.18	-	15.00	.00	58.16	.1230	12.855	3.304	1.169	2.910	472.92	4.52
99	2	5.94	-	15.00	.00	88.14	.1245	13.702	3.289	1.487	1.393	708.25	6.43

TABLE IV

HEAT TRANSFER DATA

Run	Gage No.	M_∞	α	ψ	$\dot{q}$	$\frac{\dot{q}}{\dot{q}_o}$	$\frac{\dot{q}}{\dot{q}_{REF}}$	$\frac{\dot{q}}{(H_o-H_w)} \times 10^6$	$C_H \times 10^3$	$C_H\sqrt{R_{N/2}}\,\bar{x}$	$\dot{q}_o$	$\dot{q}_{REF}$
99	3	5.94	- 15.00	.00	91.54	.1292	14.229	3.415	1.544	1.747	708.25	6.43
99	4	5.94	- 15.00	.00	116.96	.1651	18.181	4.364	1.973	2.559	708.25	6.43
99	5	5.94	- 15.00	.00	128.58	.1815	19.988	4.797	2.169	3.131	708.25	6.43
99	6	5.94	- 15.00	.00	123.23	.1740	19.156	4.598	2.079	3.278	708.25	6.43
99	8	5.94	- 15.00	.00	107.33	.1515	16.684	4.005	1.811	3.230	708.25	6.43
99	9	5.94	- 15.00	.00	107.55	.1519	16.719	4.013	1.814	3.387	708.25	6.43
99	10	5.94	- 15.00	.00	101.63	.1435	15.798	3.792	1.714	3.336	708.25	6.43
99	11	5.94	- 15.00	.00	95.49	.1348	14.844	3.563	1.611	3.222	708.25	6.43
99	12	5.94	- 15.00	.00	106.18	.1499	16.505	3.962	1.791	3.343	708.25	6.43
99	13	5.94	- 15.00	.00	100.61	.1421	15.639	3.754	1.697	3.168	708.25	6.43
99	14	5.94	- 15.00	.00	84.66	.1195	13.160	3.159	1.428	2.666	708.25	6.43
100	1	6.19	- 15.00		36.10	.0743	8.042	2.086	.725	.678	486.07	4.49
100	2	6.19	- 15.00		132.28	.2721	29.468	7.645	2.657	3.373	486.07	4.49
100	3	6.19	- 15.00		130.19	.2678	29.002	7.524	2.615	4.008	486.07	4.49
100	4	6.19	- 15.00		120.37	.2476	26.815	6.957	2.418	4.248	486.07	4.49
100	5	6.19	- 15.00		114.62	.2358	25.534	6.625	2.303	4.503	486.07	4.49
100	6	6.19	- 15.00		111.56	.2295	24.852	6.448	2.241	4.787	486.07	4.49
100	7	6.19	- 15.00		103.90	.2138	23.146	6.005	2.087	4.800	486.07	4.49
100	8	6.19	- 15.00		98.09	.2018	21.851	5.669	1.971	4.762	486.07	4.49
100	9	6.19	- 15.00		101.33	.2085	22.573	5.857	2.036	5.147	486.07	4.49
100	10	6.19	- 15.00		98.34	.2023	21.908	5.684	1.976	5.207	486.07	4.49
100	11	6.19	- 15.00		98.01	.2016	21.833	5.665	1.969	5.334	486.07	4.49
100	12	6.19	- 15.00		106.25	.2186	23.670	6.141	2.135	5.397	486.07	4.49
100	13	6.19	- 15.00		88.76	.1826	19.774	5.130	1.783	4.509	486.07	4.49
100	14	6.19	- 15.00		73.25	.1507	16.319	4.234	1.472	3.721	486.07	4.49
101	1	5.61	- 15.00		85.25	.0772	9.093	2.054	1.150	.597	104.26	9.38
101	2	5.61	- 15.00		55.25	.0500	5.893	1.331	.745	.525	104.26	9.38
101	3	5.61	- 15.00		201.95	.1829	21.541	4.866	2.724	2.318	104.26	9.38
101	4	5.61	- 15.00		241.79	.2190	25.790	5.826	2.262	3.182	104.26	9.38
101	5	5.61	- 15.00		236.72	.2144	25.250	5.704	2.193	3.468	104.26	9.38
101	6	5.61	- 15.00		220.28	.1995	23.495	5.308	2.972	3.524	104.26	9.38
101	7	5.61	- 15.00		203.59	.1844	21.715	4.906	2.746	3.507	104.26	9.38
101	8	5.61	- 15.00		195.93	.1774	20.899	4.721	2.643	3.547	104.26	9.38
101	9	5.61	- 15.00		198.24	.1795	21.145	4.777	2.674	3.755	104.26	9.38
101	10	5.61	- 15.00		187.83	.1701	20.034	4.526	2.534	3.709	104.26	9.38
101	11	5.61	- 15.00		181.21	.1641	19.329	4.366	2.445	3.678	104.26	9.38
101	12	5.61	- 15.00		217.36	.1968	23.184	5.237	2.932	4.117	104.26	9.38

TABLE IV

HEAT TRANSFER DATA

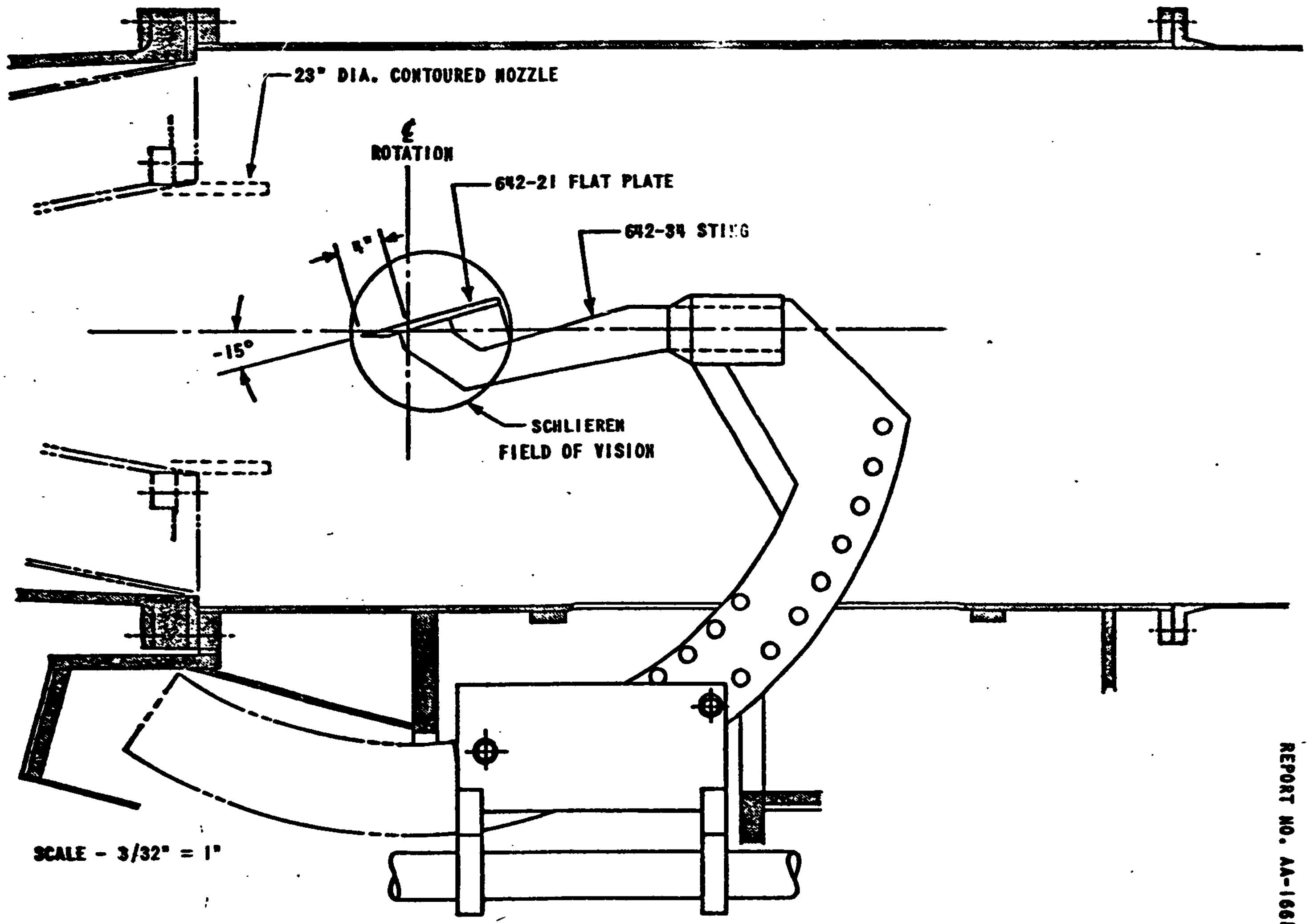
Run	Gage No.	M_∞	α	ψ	$\dot{q}$	$\frac{\dot{q}}{\dot{q}_o}$	$\frac{\dot{q}}{\dot{q}_{REF}}$	$\frac{\dot{q}}{(H_o - H_w)} \times 10^6$	$C_H \times 10^3$	$C_H\sqrt{R_{N/2}\,X}$	$\dot{q}_o$	$\dot{q}_{REF}$
101	13	5.61	-15.00		182.82	.1656	19.500	4.405	2.466	3.463	104.26	9.38
101	14	5.61	-15.00		164.93	.1494	17.592	3.974	2.225	3.124	104.26	9.38
102	1	6.18	-20.00		75.28	.1592	16.572	4.301	1.500	1.392	472.82	4.54
102	2	6.18	-20.00		178.26	.3770	39.240	10.185	3.553	4.478	472.82	4.54
102	3	6.13	-20.00		164.29	.3475	36.165	9.387	3.274	4.984	472.82	4.54
102	4	6.18	-20.00		151.66	.3207	33.383	8.665	3.023	5.274	472.82	4.54
102	5	6.18	-20.00		149.35	.3159	32.875	8.533	2.976	5.781	472.82	4.54
102	6	6.18	-20.00		140.01	.2961	30.819	8.000	2.790	5.919	472.82	4.54
102	7	6.18	-20.00		134.28	.2840	29.559	7.672	2.676	6.112	472.82	4.54
102	8	6.18	-20.00		133.39	.2821	29.363	7.621	2.658	6.381	472.82	4.54
102	9	6.18	-20.00		131.79	.2787	29.010	7.530	2.627	6.596	472.82	4.54
102	10	6.18	-20.00		129.52	.2739	28.511	7.400	2.581	6.758	472.82	4.54
102	11	6.18	-20.00		128.19	.2711	28.218	7.324	2.555	6.875	472.82	4.54
102	12	6.18	-20.00		132.56	.2804	29.179	7.574	2.642	6.635	472.82	4.54
102	13	6.18	-20.00		116.63	.2467	25.674	6.664	2.325	5.838	472.82	4.54
102	14	6.18	-20.00		93.30	.1973	20.538	5.331	1.860	4.670	472.82	4.54
103	1	5.61	-15.00		94.11	.0853	10.071	2.262	1.278	.659	102.92	9.34
103	2	5.61	-15.00		77.86	.0706	8.333	1.872	1.057	.741	102.92	9.34
103	3	5.61	-15.00		206.31	.1871	22.078	4.959	2.802	2.371	102.92	9.34
103	4	5.61	-15.00		259.44	.2352	27.763	6.236	3.523	3.417	102.92	9.34
103	5	5.61	-15.00		235.70	.2137	25.224	5.666	3.201	3.456	102.92	9.34
103	6	5.61	-15.00		222.31	.2016	23.790	5.344	3.019	3.560	102.92	9.34
103	7	5.61	-15.00		212.49	.1927	22.740	5.108	2.886	3.663	102.92	9.34
103	8	5.61	-15.00		200.20	.1815	21.425	4.812	2.719	3.628	102.92	9.34
103	9	5.61	-15.00		200.89	.1821	21.498	4.829	2.728	3.809	102.92	9.34
103	10	5.61	-15.00		197.35	.1789	21.119	4.744	2.680	3.900	102.92	9.34
103	11	5.61	-15.00		184.72	.1675	19.768	4.440	2.509	3.753	102.92	9.34
103	12	5.61	-15.00		215.00	.1949	23.008	5.168	2.920	4.076	102.92	9.34
103	13	5.61	-15.00		187.84	.1703	20.102	4.515	2.551	3.561	102.92	9.34
103	14	5.61	-15.00		163.05	.1478	17.448	3.919	2.214	3.091	102.92	9.34
104	1	6.38	-15.00		40.07	.1440	14.040	3.889	1.045	1.363	278.23	2.85
104	2	6.38	-15.00		92.61	.3329	32.452	8.990	2.414	4.279	278.23	2.85
104	3	6.38	-15.00		81.88	.2943	28.691	7.948	2.135	4.568	278.23	2.85
104	4	6.38	-15.00		78.49	.2821	27.502	7.618	2.046	5.020	278.23	2.85
104	5	6.38	-15.00		72.60	.2609	25.499	7.047	1.893	5.169	278.23	2.85

[redacted]

TABLE IV

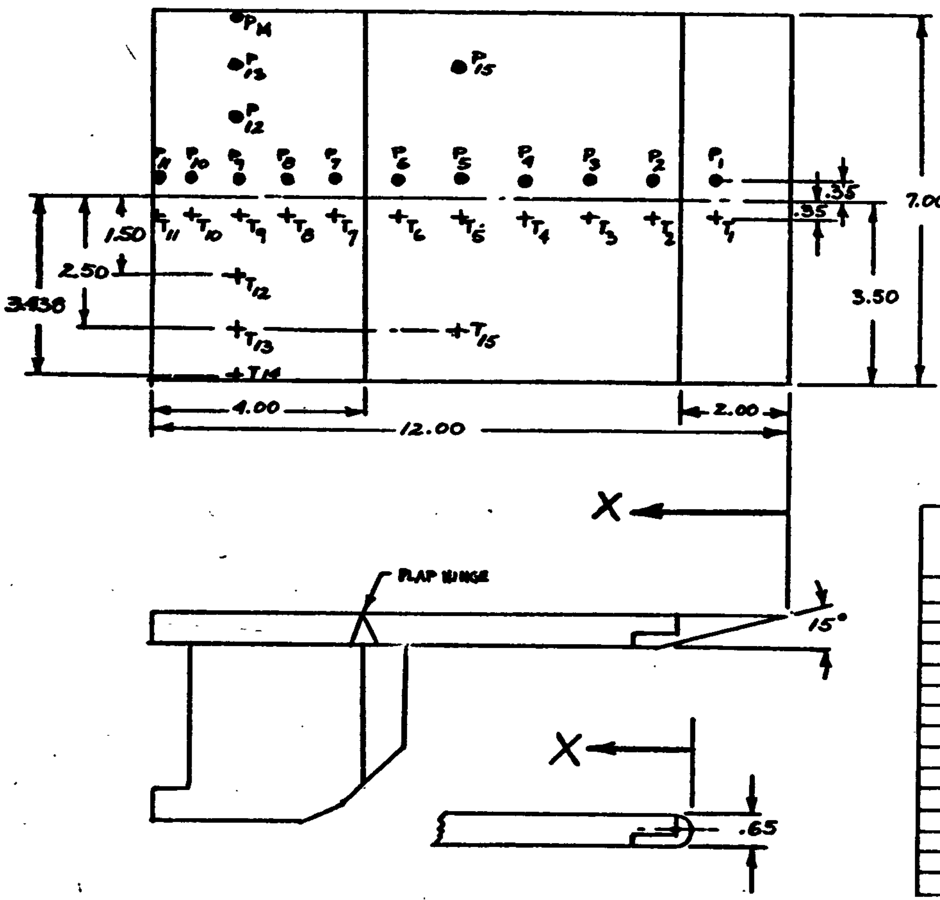
HEAT TRANSFER DATA

Run	Gage No.	M_∞		α	ψ	$\dot{q}$	$\frac{\dot{q}}{\dot{q}_o}$	$\frac{\dot{q}}{\dot{q}_{REF}}$	$\frac{\dot{q}}{(H_o-H_w)}\times 10^6$	$C_H\times 10^3$	$C_H\sqrt{R_{N/2}}\,\bar{x}$	$\dot{q}_o$	$\dot{q}_{REF}$
104	6	6.38	-	15.00		69.01	.2480	24.181	6.699	1.799	5.366	278.23	2.85
104	8	6.38	-	15.00		63.67	.2288	22.309	6.180	1.660	5.602	278.23	2.85
104	9	6.38	-	15.00		63.52	.2283	22.257	6.166	1.656	5.848	278.23	2.85
104	12	6.38	-	15.00		66.46	.2389	23.287	6.451	1.733	6.118	278.23	2.85
104	13	6.38	-	15.00		55.74	.2003	19.530	5.410	1.459	5.131	278.23	2.85
104	14	6.38	-	15.00		43.86	.1576	15.368	4.257	1.143	4.038	278.23	2.85
105	1	6.18	-	25.00		143.93	.2996	30.722	8.271	2.755	2.621	480.40	4.68
105	2	6.18	-	25.00		215.01	.4476	45.896	12.356	4.115	5.319	480.40	4.68
105	3	6.18	-	25.00		192.19	.4000	41.023	11.044	3.678	5.741	480.40	4.68
105	4	6.18	-	25.00		179.17	.3730	38.245	10.296	3.429	6.136	480.40	4.68
105	5	6.18	-	25.00		176.38	.3671	37.649	10.136	3.376	6.723	480.40	4.68
105	6	6.18	-	25.00		166.85	.3473	35.616	9.588	3.194	6.947	480.40	4.68
105	7	6.18	-	25.00		155.37	.3234	33.166	8.929	2.974	6.964	480.40	4.68
105	8	6.18	-	25.00		153.75	.3200	32.818	8.835	2.943	7.243	480.40	4.68
105	9	6.18	-	25.00		154.48	.3216	32.975	8.877	2.957	7.614	480.40	4.68
105	10	6.18	-	25.00		145.47	.3028	31.052	8.359	2.784	7.474	480.40	4.68
105	11	6.18	-	25.00		149.44	.3111	31.899	8.588	2.860	7.892	480.40	4.68
105	12	6.18	-	25.00		158.29	.3295	33.787	9.096	3.030	7.802	480.40	4.68
105	13	6.18	-	25.00		134.97	.2809	28.810	7.756	2.583	6.653	480.40	4.68
105	14	6.18	-	25.00		111.95	.2330	23.896	6.433	2.143	5.518	480.40	4.69



FLAT PLATE MODEL TEST INSTALLATION

Figure 37a



INSTRUMENTATION
AXIAL LOCATIONS

ORIFICE OR GAGE NO.	SHARP X INCHES	BLUNT X INCHES
1	1.42	——
2	2.62	.945
3	3.82	2.145
4	5.02	3.345
5	6.22	4.545
6	7.42	5.745
7	8.60	6.945
8	9.50	8.045
9	10.40	8.945
10	11.30	9.845
11	11.938	10.263
12	10.40	8.945
13	10.40	8.945
14	10.40	8.945
15	6.22	4.545

FLAT PLATE MODEL

FIGURE 37b

PRESSURE AND HEAT TRANSFER DISTRIBUTIONS
ON A SHARP FLAT PLATE

$\alpha = -15^{\circ}$
$M = 6.38$
$R_N/ft = 14.3 \times 10^6$

Figure 38

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FIG. 38a.

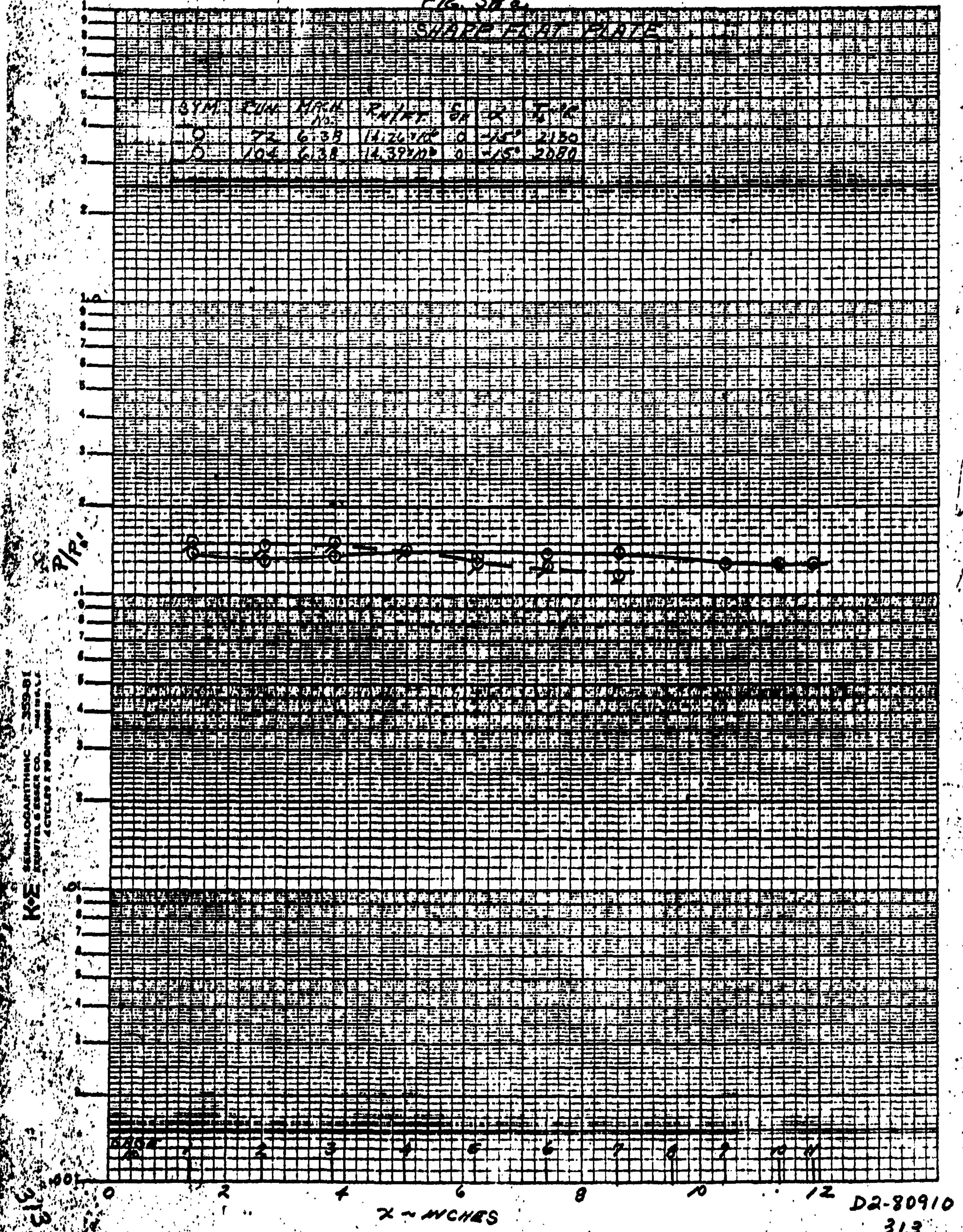
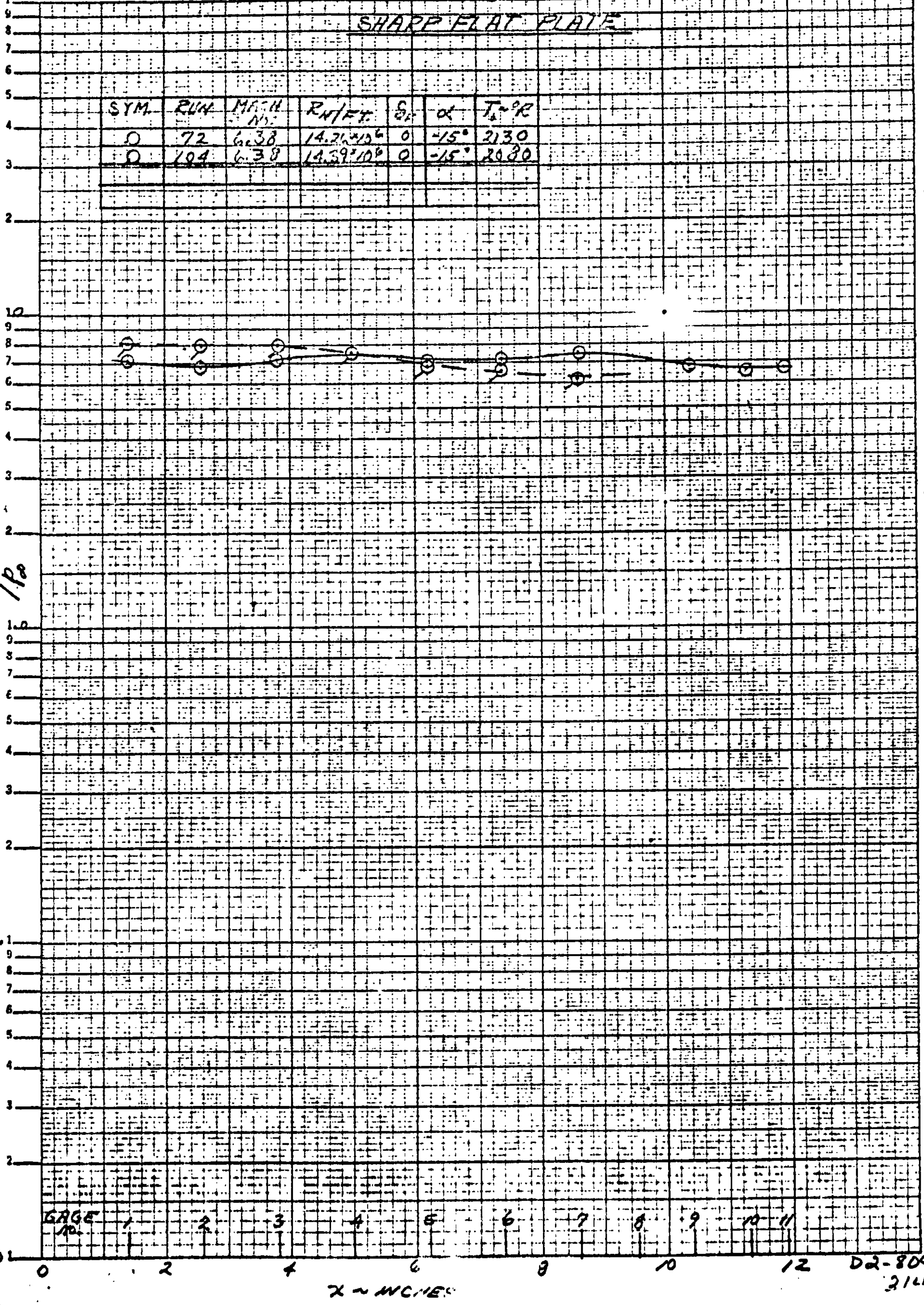

SHARP FLAT PLATE
SYM. RUN MACH NO. RN/FT. CL α TW
72 6.38 14.26×10⁶ 0 -15° 2130
104 6.38 14.39×10⁶ 0 -15° 2080
P/P0
x ~ INCHES
K-E SEMI-LOGARITHMIC 359-81 KEUFFEL & ESSER CO. 4 CYCLES X 70 DIVISIONS

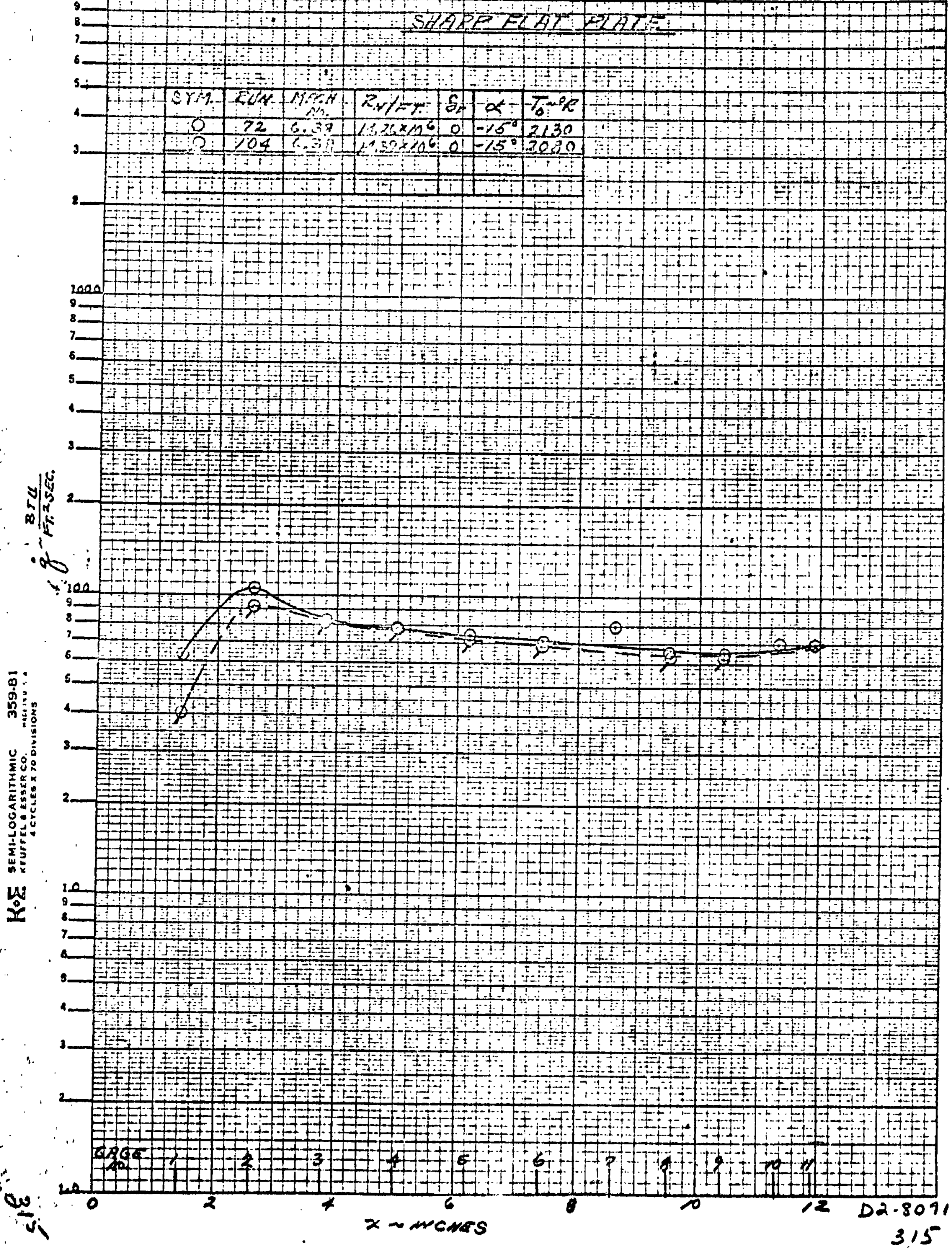
FIG. 386



314

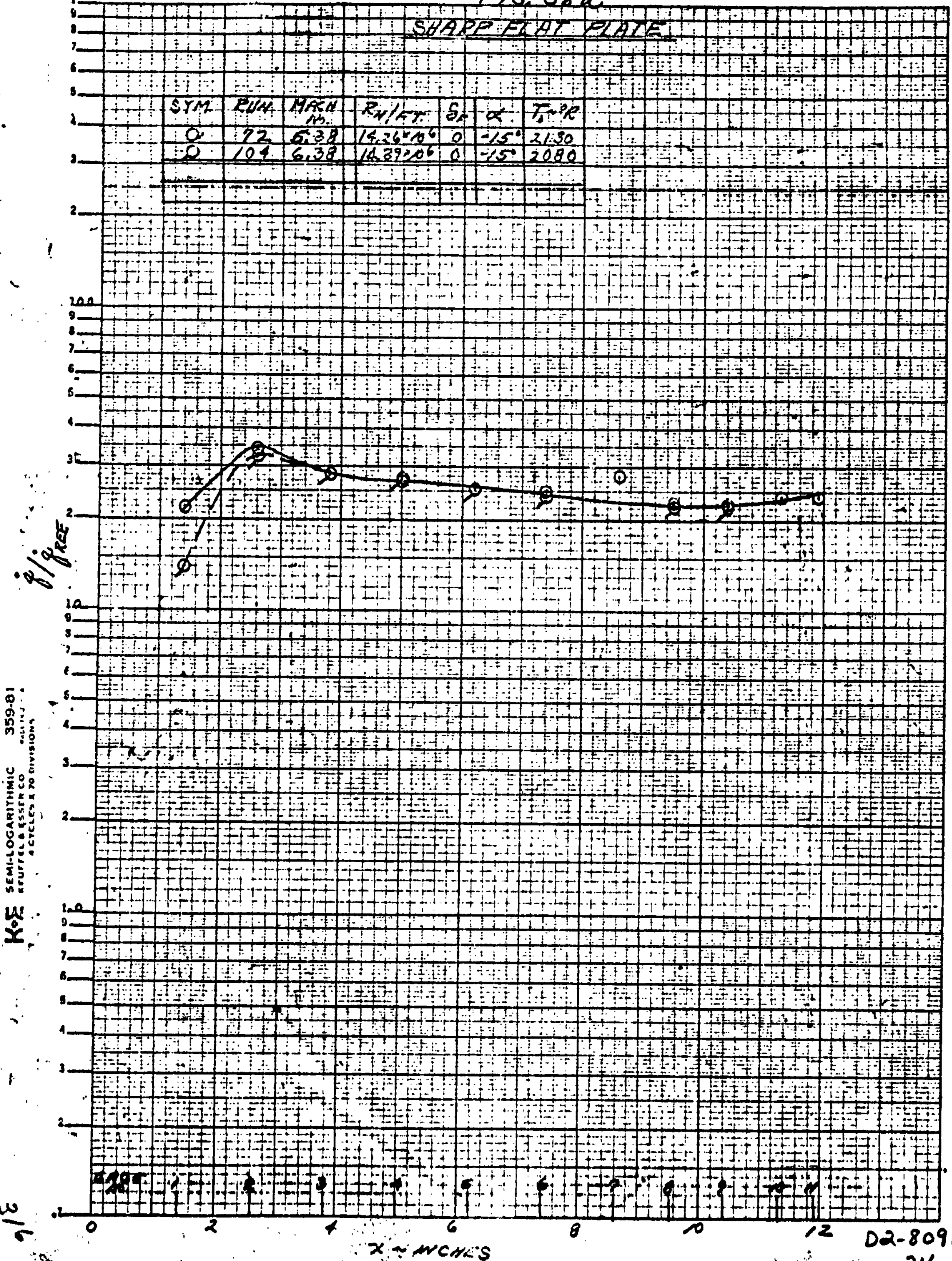
D2-80910
314L

FIG. 38C



SHARP FLAT PLATE
SYM.
RUN
MACH No.
R_N/FT.
δ_F
α
T_0 ~ °R
72
6.38
0
-15°
2130
104
6.38
0
-15°
2080
$\dot{q}$ ~ $\frac{BTU}{FT.^2 SEC.}$
GAGE NO.
1
2
3
4
5
6
7
8
9
10
11
0
2
4
6
8
10
12
x ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 38d.



316

D2-80910

PRESSURE AND HEAT TRANSFER DISTRIBUTIONS
ON A SHARP FLAT PLATE

$$\alpha = -15^{\circ}$$
$$M_{\infty} = 6.2$$
$$R_N/ft = 7 \times 10^{6}$$

Figure 39

FIG. 39a

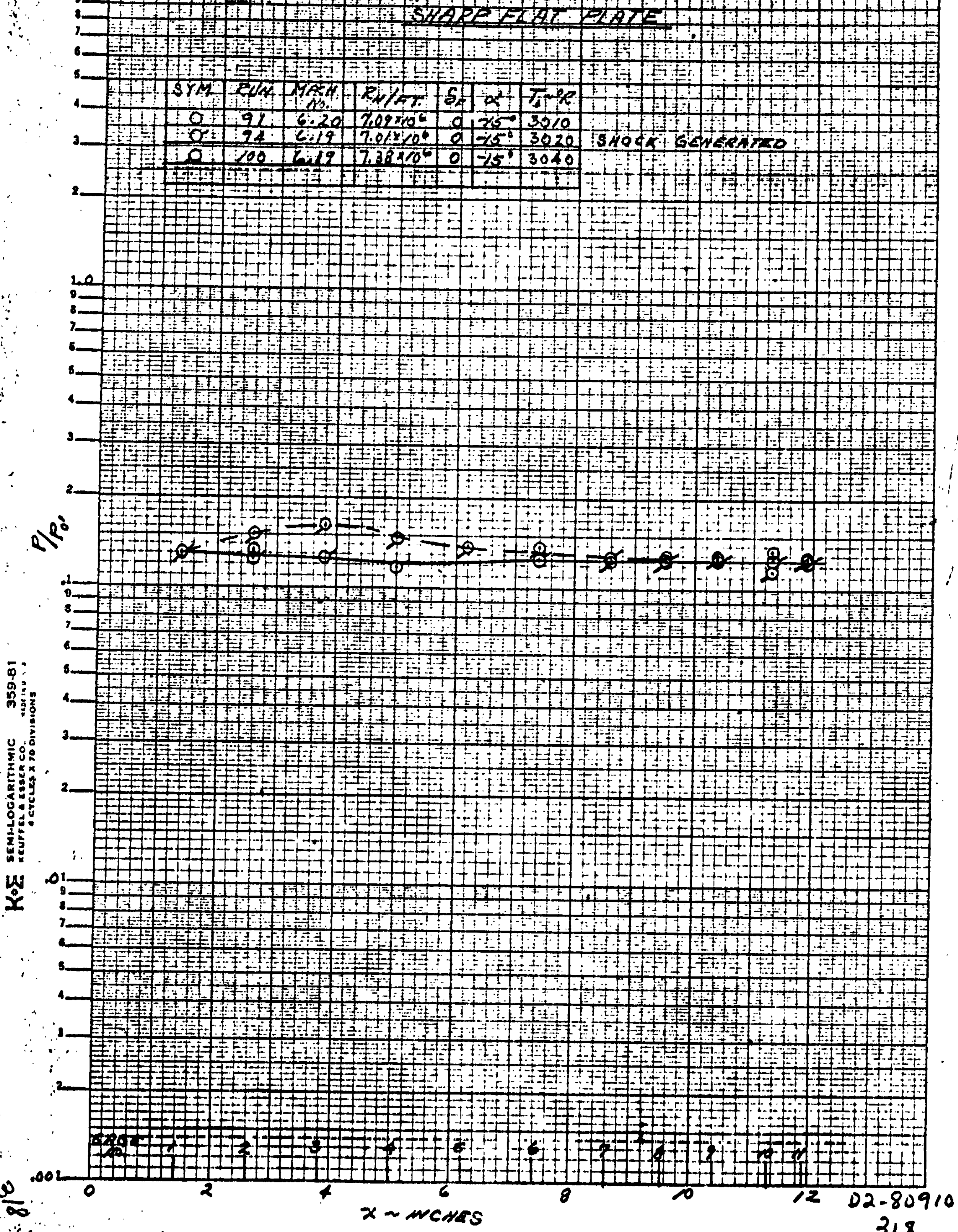

SHARP FLAT PLATE
SYM RUN MACH No. R_N/FT δ_F α T_t~°R
○ 91 6.20 7.09×10⁶ 0 -15° 3010
○ 94 6.19 7.01×10⁶ 0 -15° 3020
○ 100 6.19 7.38×10⁶ 0 -15° 3040
SHOCK GENERATED
P/P0'
x ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 39b

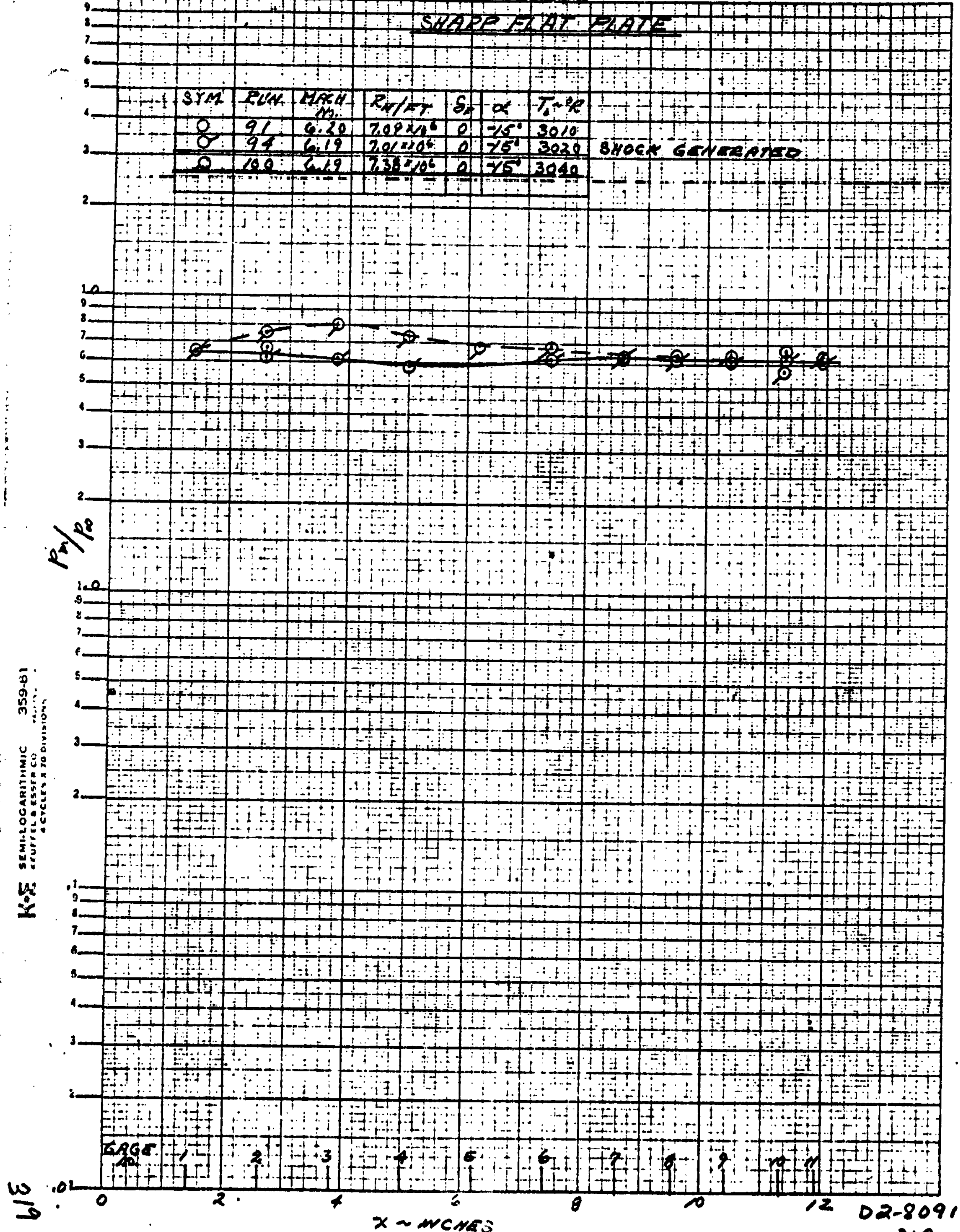

SHARP FLAT PLATE
SYM RUN MACH No. R_N/FT δ_F α T_t ~ °R
91 6.20 7.09×10^6 0 -15° 3010
94 6.19 7.01×10^6 0 -15° 3020
100 6.19 7.38×10^6 0 -15° 3040
SHOCK GENERATED
P_m/P_0
GAGE NO. 1 2 3 4 5 6 7 8 9 10 11
0 2 4 6 8 10 12
X ~ INCHES
K+E SEMI-LOGARITHMIC 359-81

FIG. 39c

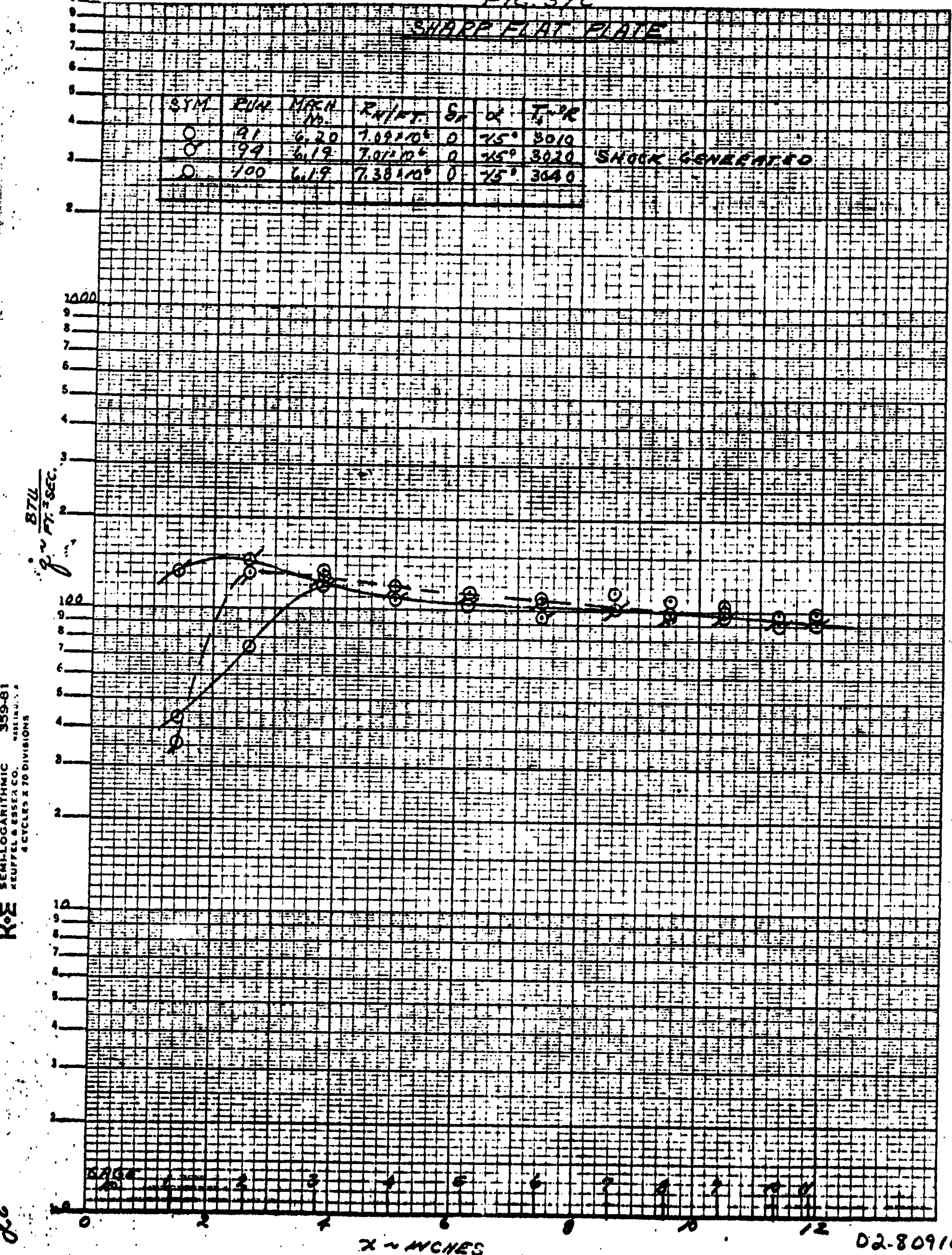
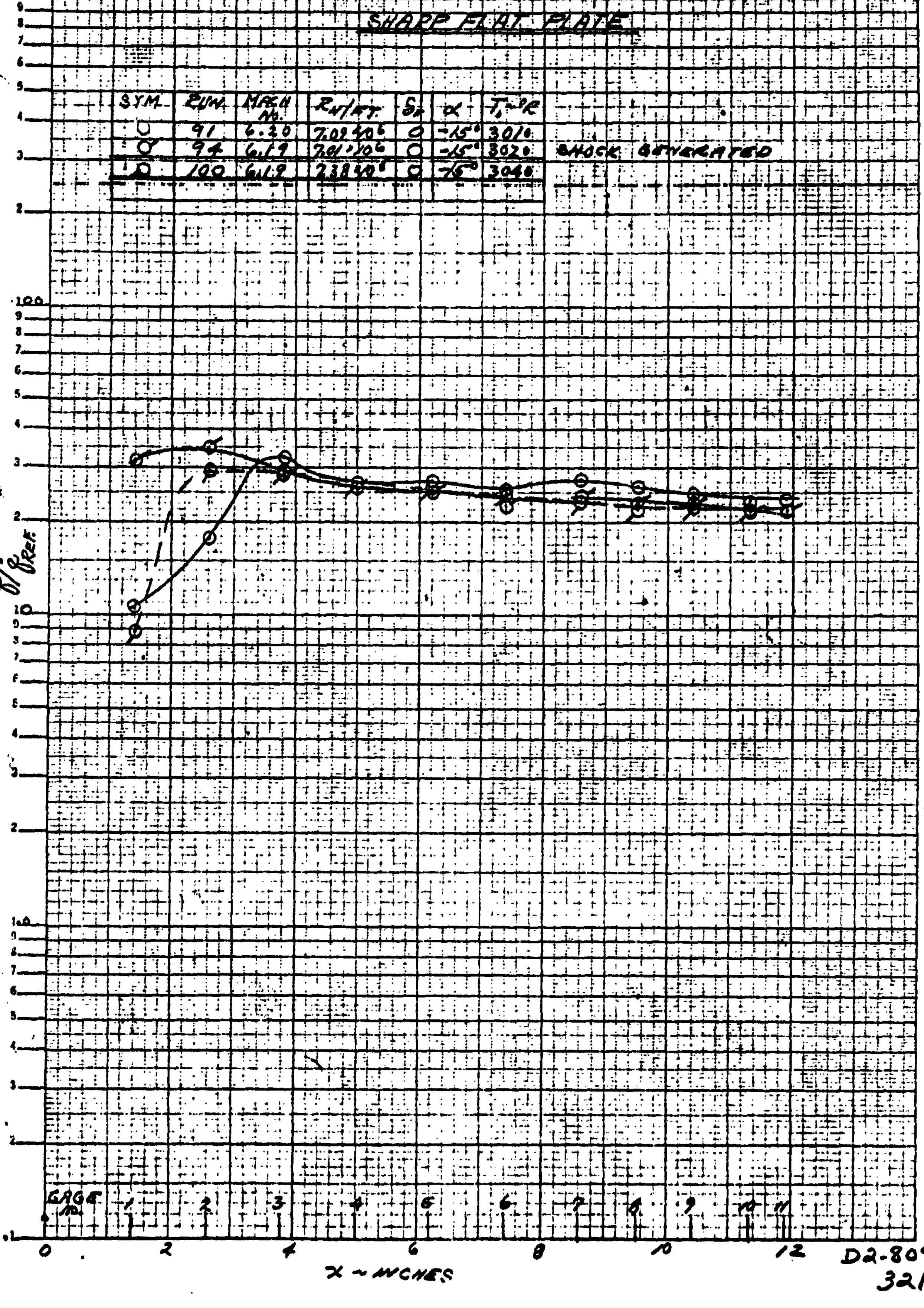

SHARP FLAT PLATE
SYM | RUN | MACH No. | R_N/FT. | δ_F | α | T_0 ~°R
91 | 6.20 | 7.09×10⁶ | 0 | 75° | 3010
99 | 6.19 | 7.01×10⁶ | 0 | 75° | 3020
100 | 6.19 | 7.38×10⁶ | 0 | 75° | 3040
SHOCK GENERATED
$\dot{q}$ ~ BTU/FT.² SEC.
EDGE
x ~ INCHES
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 39d.


SHARP FLAT PLATE
SYM. RUN MACH M. RN/FT. δF α T0 °R
○ 91 6.20 7.09×10⁶ 0 -15° 3010
○ 94 6.19 7.01×10⁶ 0 -15° 3020 SHOCK GENERATED
○ 100 6.19 2.38×10⁶ 0 -15° 3040
q/qREF.
GAGE NO. 1 2 3 4 5 6 7 8 9 10 11
0 2 4 6 8 10 12
x ~ INCHES

PRESSURE AND HEAT TRANSFER DISTRIBUTIONS
ON A SHARP FLAT PLATE

$$\alpha = -15^{\circ}$$
$$M_{\infty} = 5.6$$
$$R_N/ft = 2.2 \times 10^6$$

Figure 40

FIG. 40a

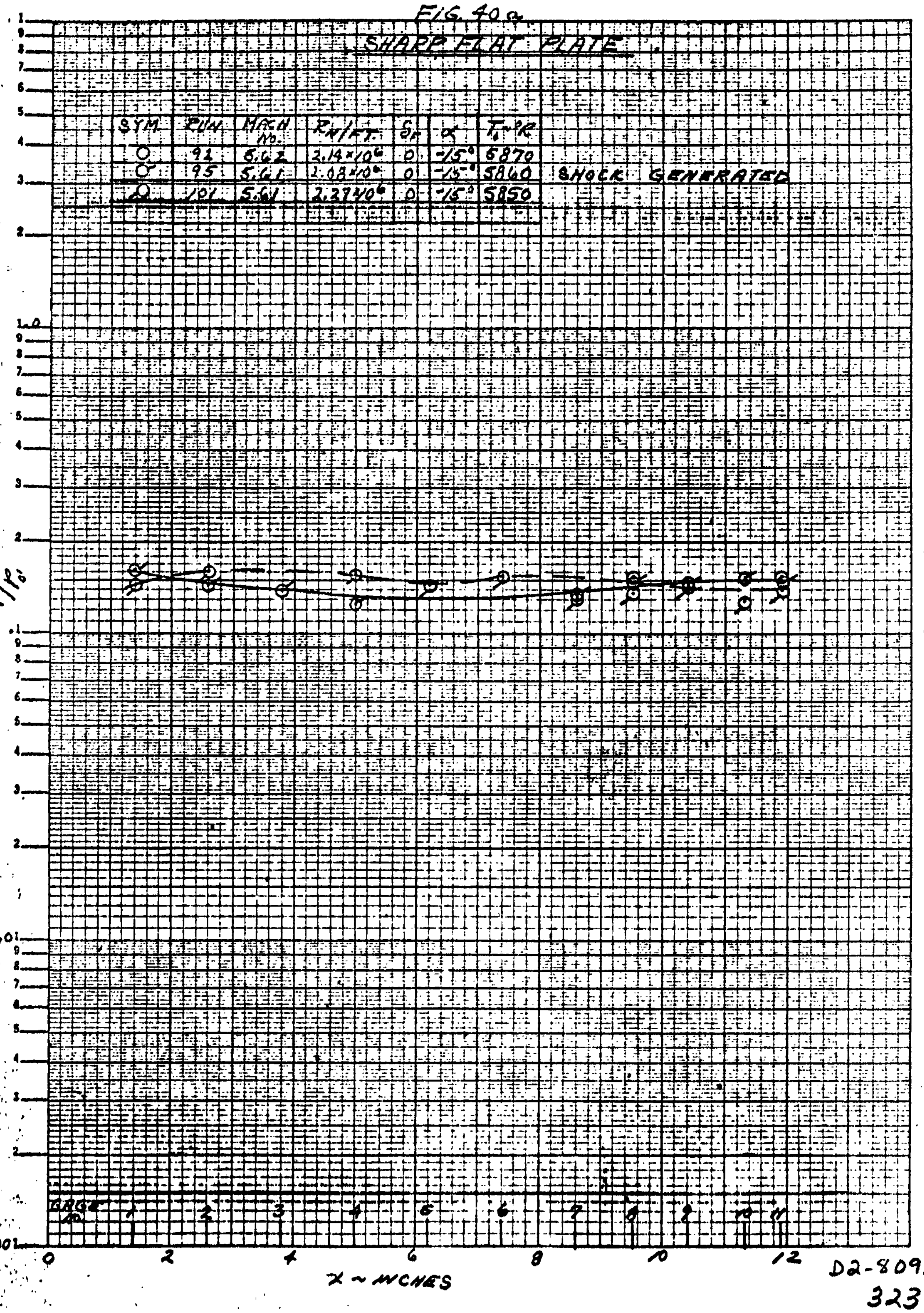
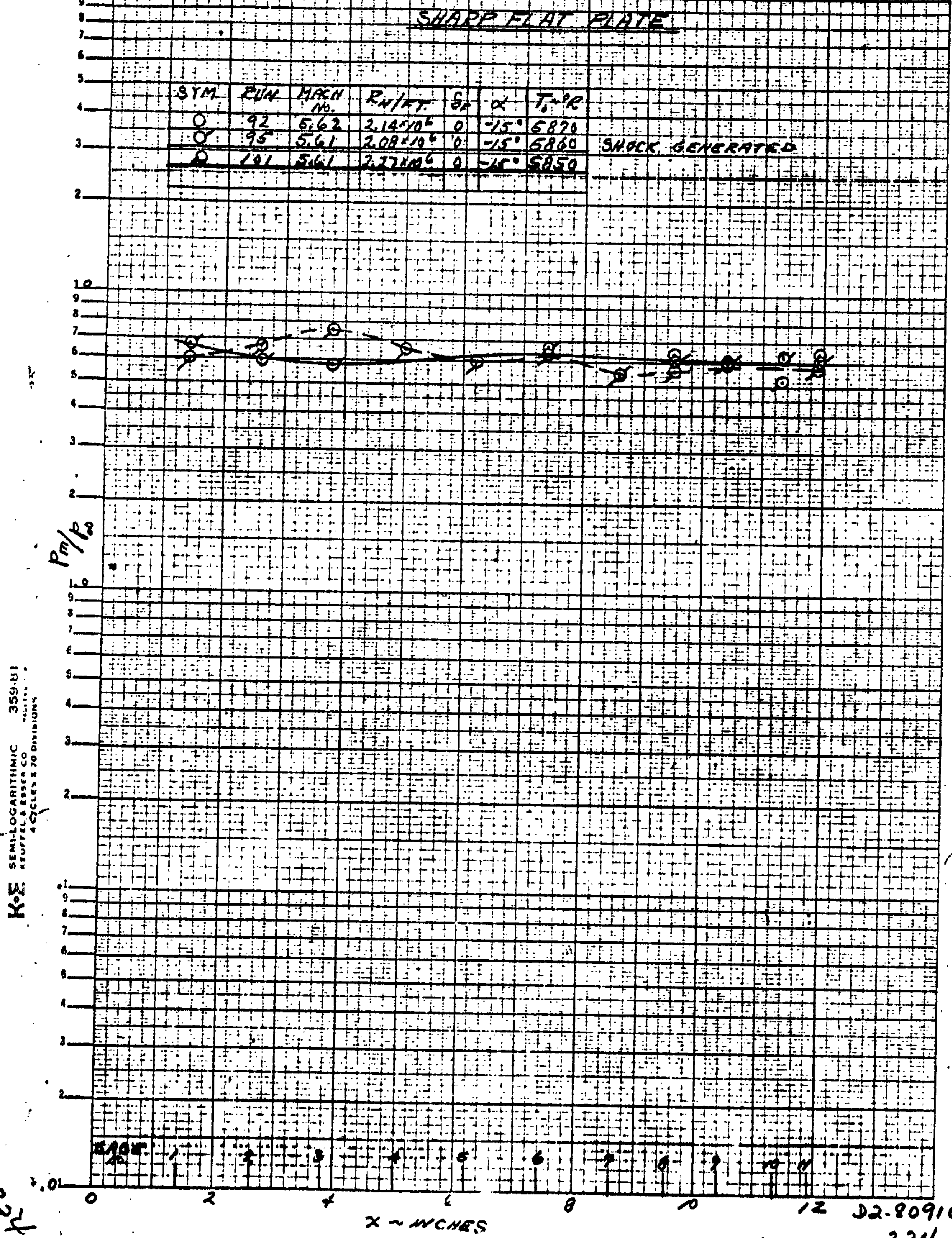

SHARP FLAT PLATE
SYM | RUN | MACH No. | R_N/FT. | δ_F | α | T_0 °R
92 | 5.62 | 2.14×10⁶ | 0 | -15° | 5870
95 | 5.61 | 2.08×10⁶ | 0 | -15° | 5860
101 | 5.61 | 2.27×10⁶ | 0 | -15° | 5850
SHOCK GENERATED
P/P₀
GAGE No.
x ~ INCHES
SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 40 b



SHARP FLAT PLATE
SYM. RUN MACH No. R_N/FT. δ_F α T_0 ~ °R
92 5.62 2.14×10⁶ 0 -15° 5870
95 5.61 2.08×10⁶ 0 -15° 5860
101 5.61 2.27×10⁶ 0 -15° 5850
SHOCK GENERATED
P_m/P_∞
EDGE 1 2 3 4 5 6 7 8 9 10 11
0 2 4 6 8 10 12
X ~ INCHES
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 40c

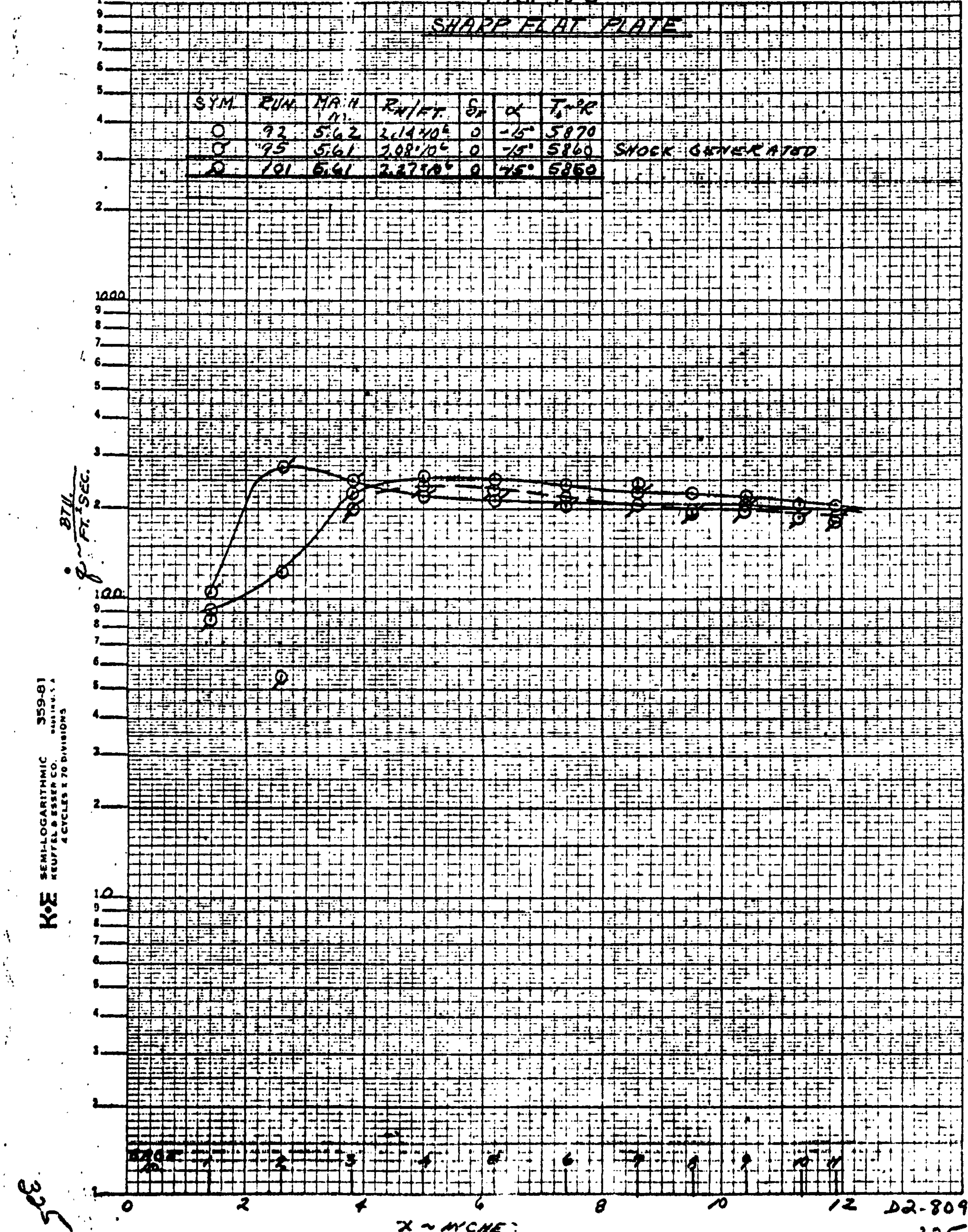
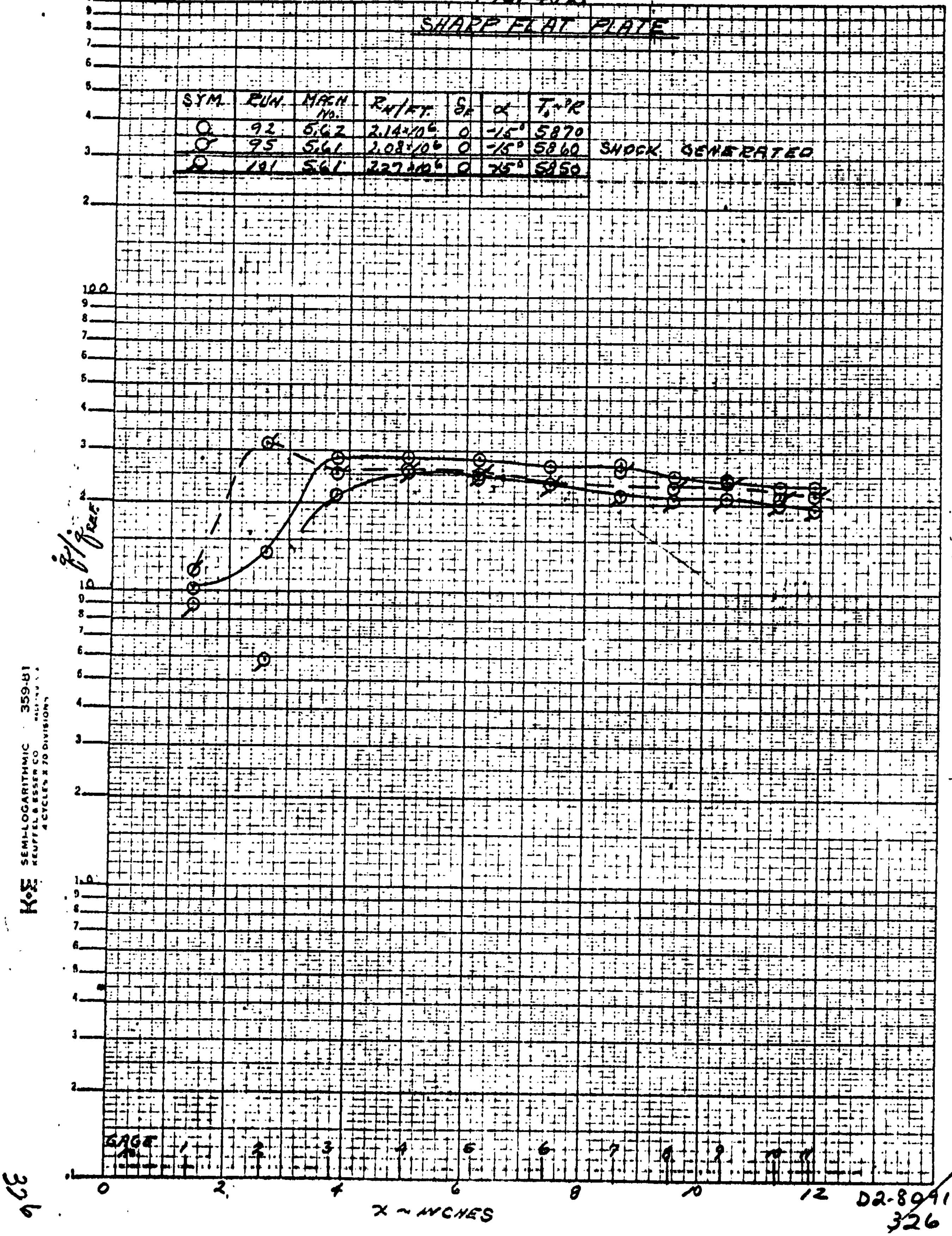

SHARP FLAT PLATE
SYM. RUN MACH M. R_N/FT. δ_F α T_o ~°R
92 5.62 2.14×10^6 0 -15° 5870
95 5.61 2.08×10^6 0 -15° 5860 SHOCK GENERATED
101 5.61 2.27×10^6 0 -15° 5850
$\dot{q}$ ~ BTU/FT.² SEC.
X ~ INCHES
0 2 4 6 8 10 12
1000
100
10
K&E SEMI-LOGARITHMIC 359-81 KEUFFEL & ESSER CO. 4 CYCLES X 70 DIVISIONS

FIG. 40 d.



SHARP FLAT PLATE
SYM. RUN. MACH No. R_N/FT. δ_F α T_0~°R
92 5.62 2.14×10⁶ 0 -15° 5870
95 5.61 2.08×10⁶ 0 -15° 5860 SHOCK GENERATED
101 5.61 2.27×10⁶ 0 -15° 5850
$\dot{q}/\dot{q}_{REF}$
GAGE 1 2 3 4 5 6 7 8 9 10 11
x ~ INCHES
K·E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

PRESSURE AND HEAT TRANSFER DISTRIBUTION
ON A SHARP FLAT PLATE

$\alpha = -20^{\circ}$
$M_{\infty} = 6.2$
$R_N/ft = 7 \times 10^6$

Figure 41

FIG. 41a

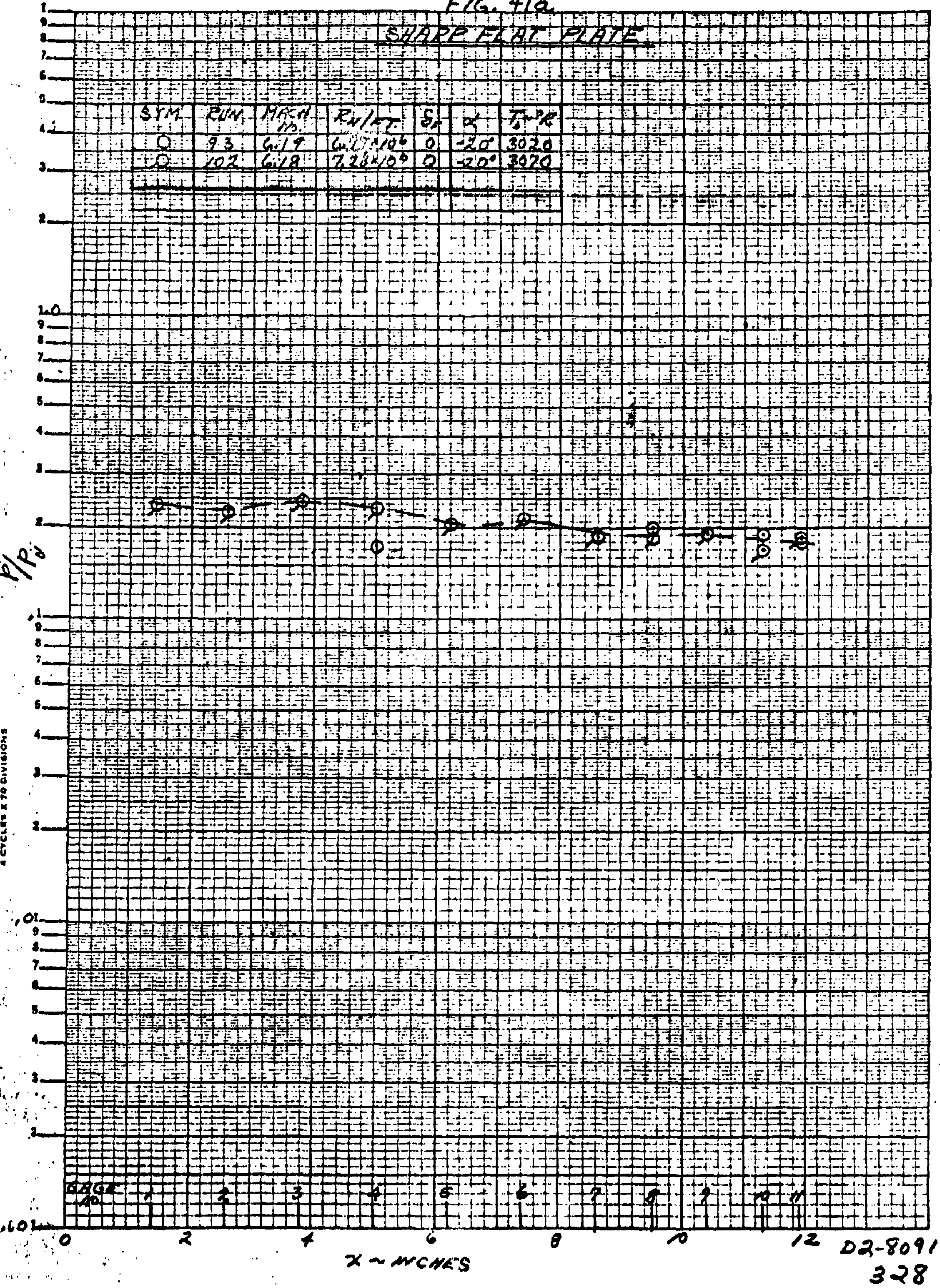

SHARP FLAT PLATE
SYM RUN MACH No. RN/FT. δF α T0 °R
93 6.19 6.?×10^6 0 -20° 3020
102 6.18 7.28×10^6 0 -20° 3020
p/p∞
GAGE NO. 1 2 3 4 5 6 7 8 9 10 11
0 2 4 6 8 10 12
X ~ INCHES
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 41 b

SHARP FLAT PLATE

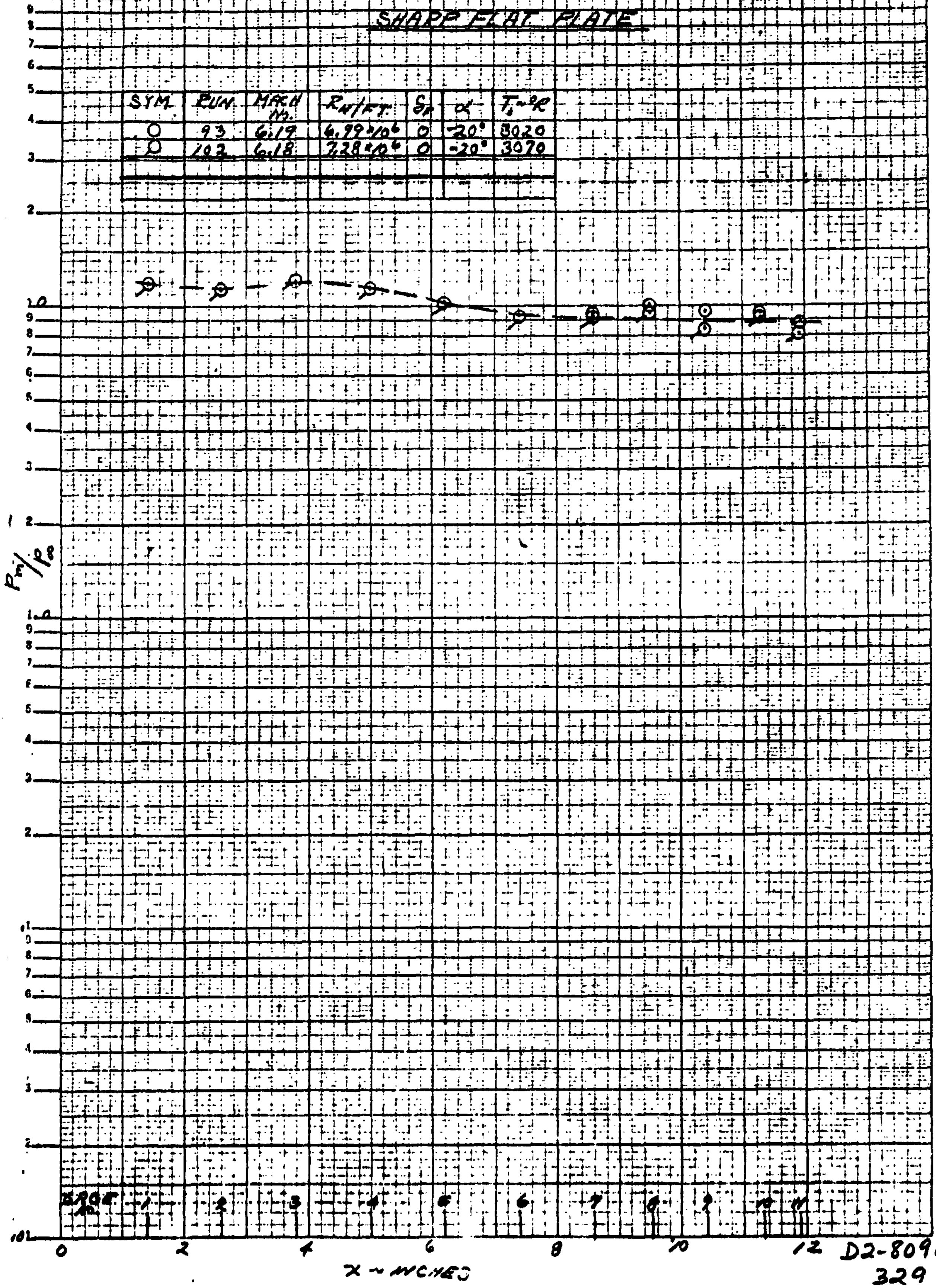
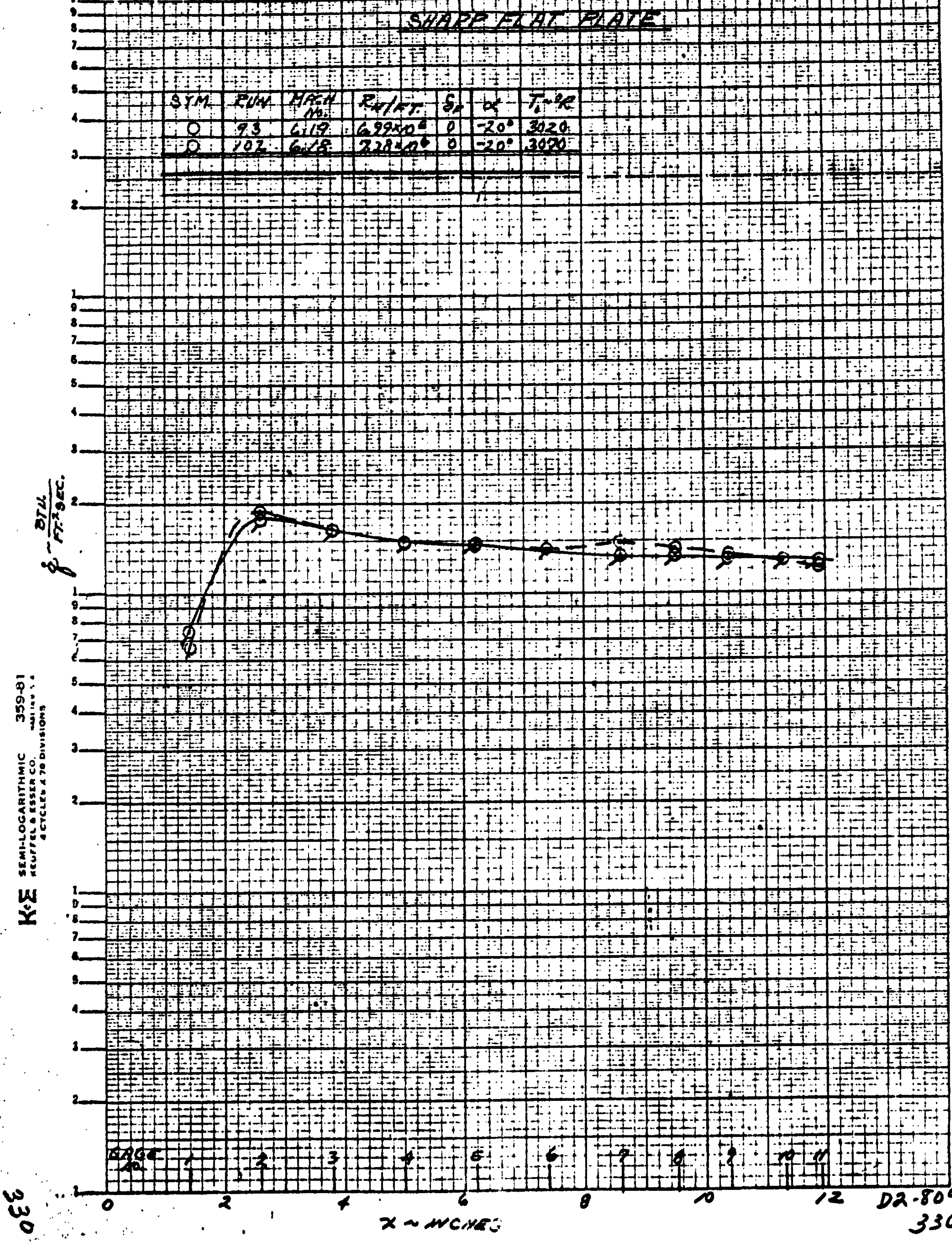


FIG. 41c


SHARP FLAT PLATE
SYM. RUN MACH No. R_N/FT. δ_F α T_t ~ °R
O 93 6.19 6.99x10^6 0 -20° 3020
O 102 6.18 2.28x10^6 0 -20° 3020
q ~ BTU/FT.² SEC.
GAGE No. 1 2 3 4 5 6 7 8 9 10 11
0 2 4 6 8 10 12
x ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES x 70 DIVISIONS

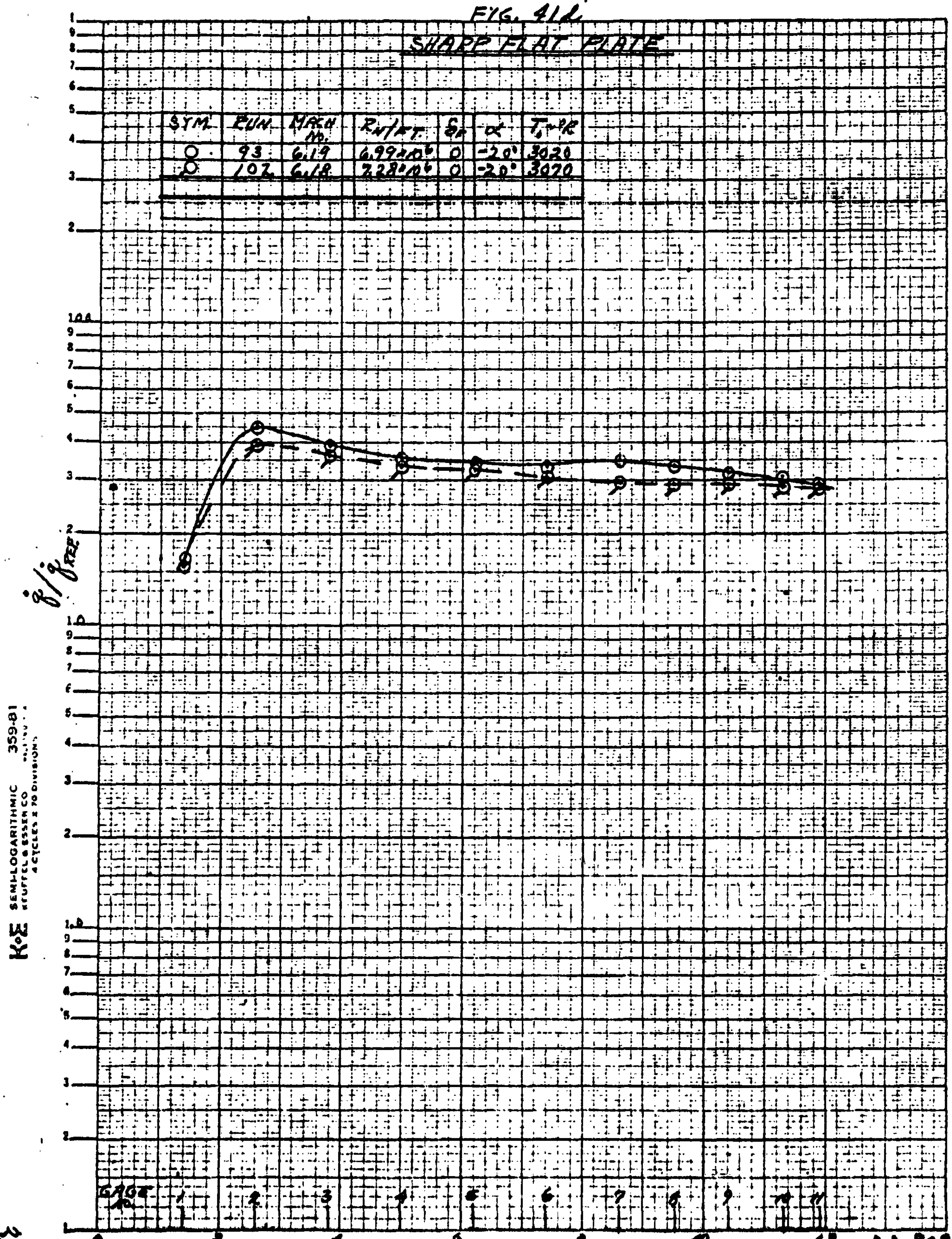


FIG. 41d
SHARP FLAT PLATE
SYM RUN MACH No. R_N/FT. δ_F α T_0 ~ °R
93 6.19 6.99×10⁶ 0 -20° 3020
102 6.18 7.28×10⁶ 0 -20° 3070
q/q_REF
GAGE No.
1 2 3 4 5 6 7 8 9 10 11
x ~ INCHES
K&E SEMI-LOGARITHMIC 359-81 KEUFFEL & ESSER CO. 4 CYCLES X 70 DIVISIONS

PRESSURE AND HEAT TRANSFER DISTRIBUTIONS
ON A SHARP FLAT PLATE

$\alpha = -25^{o}$
$M_{\infty} = 6.2$
$R_N/ft = 7 \times 10^{6}$
Figure 42

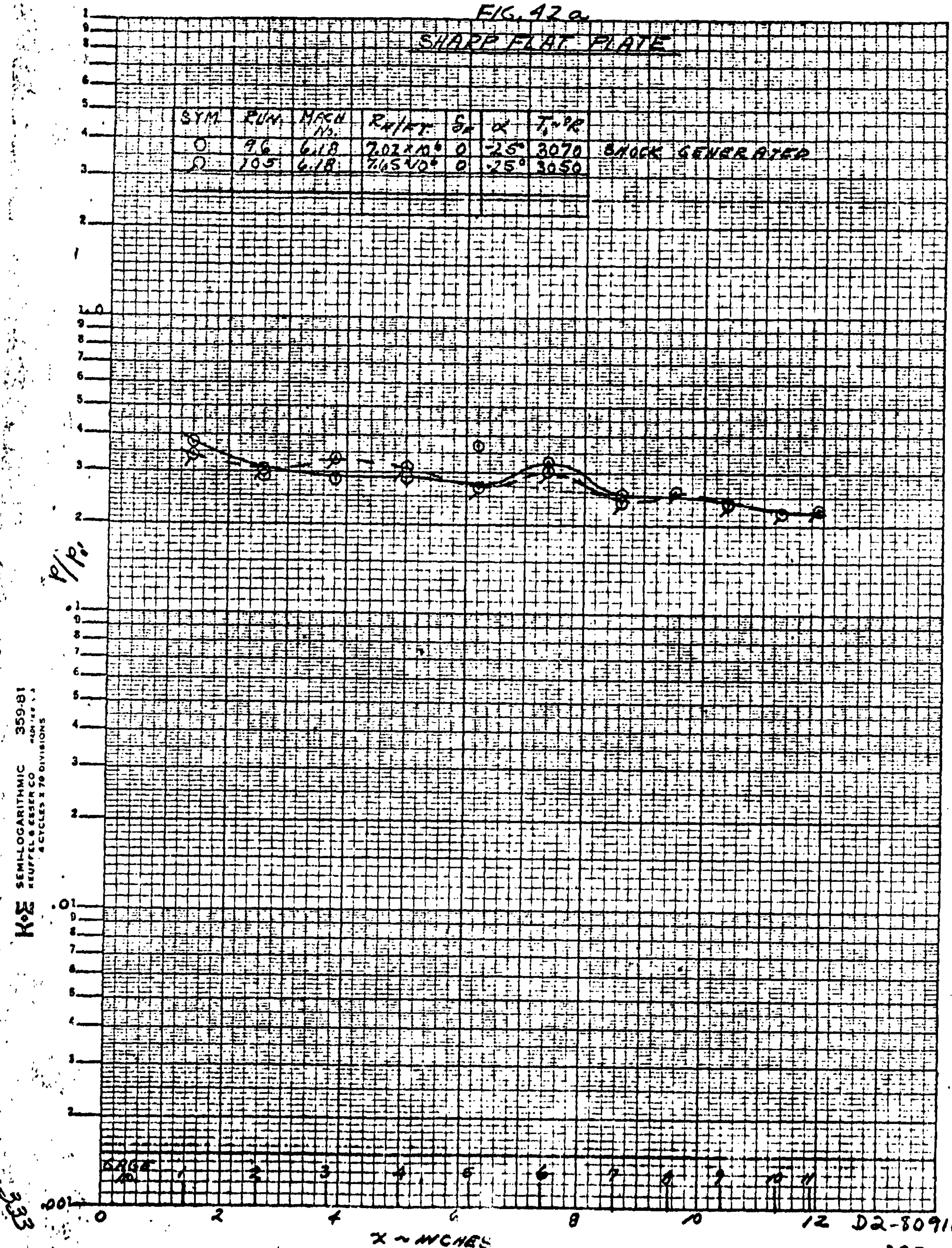


FIG. 42a
SHARP FLAT PLATE
SYM. RUN MACH No. R_N/FT. δ_F α T_0 ~°R
○ 96 6.18 7.02×10⁶ 0 -25° 3070 SHOCK GENERATED
105 6.18 7.45×10⁶ 0 -25° 3050
P/P₀
GAGE No.
x ~ INCHES
SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 42b

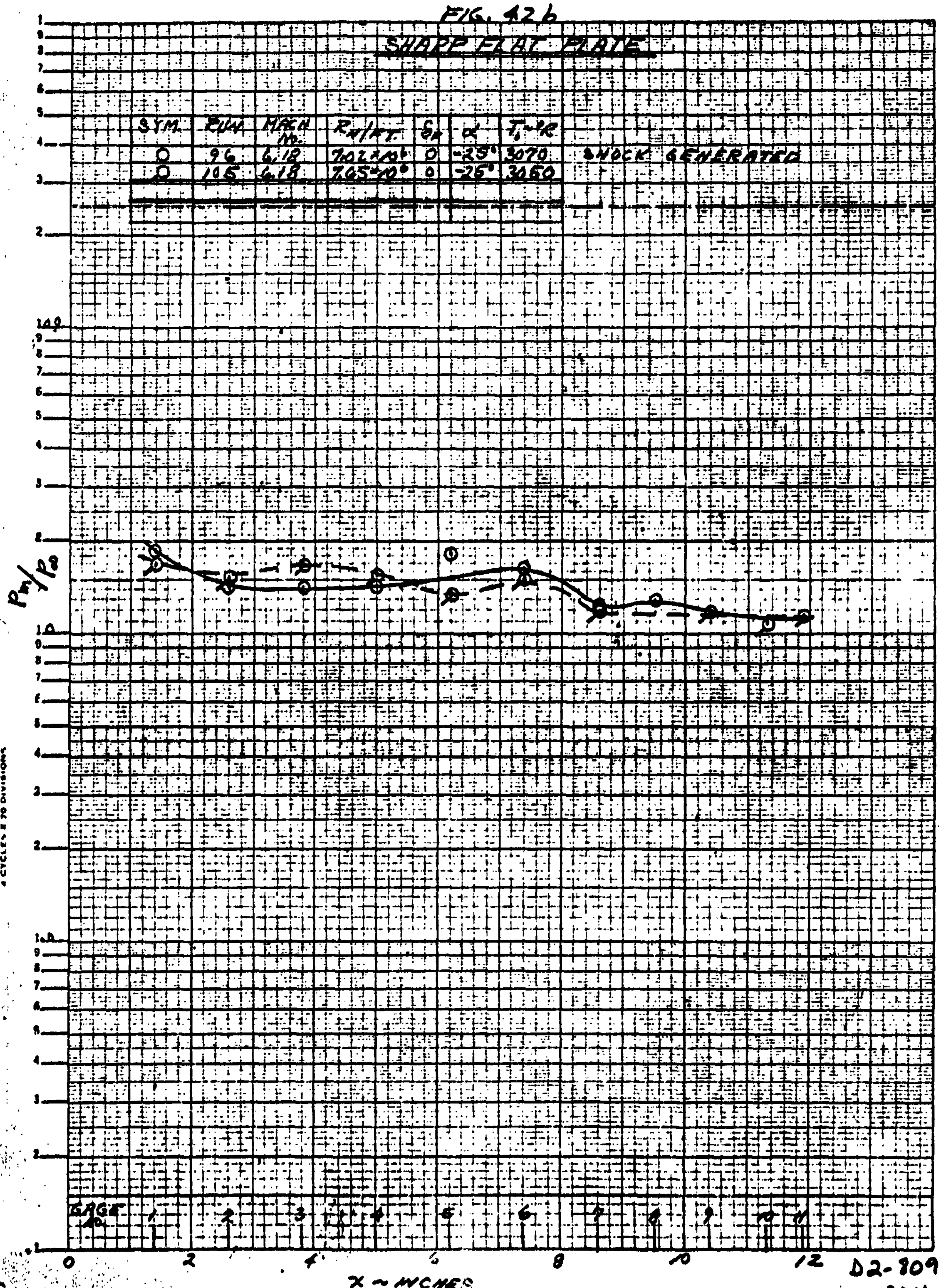
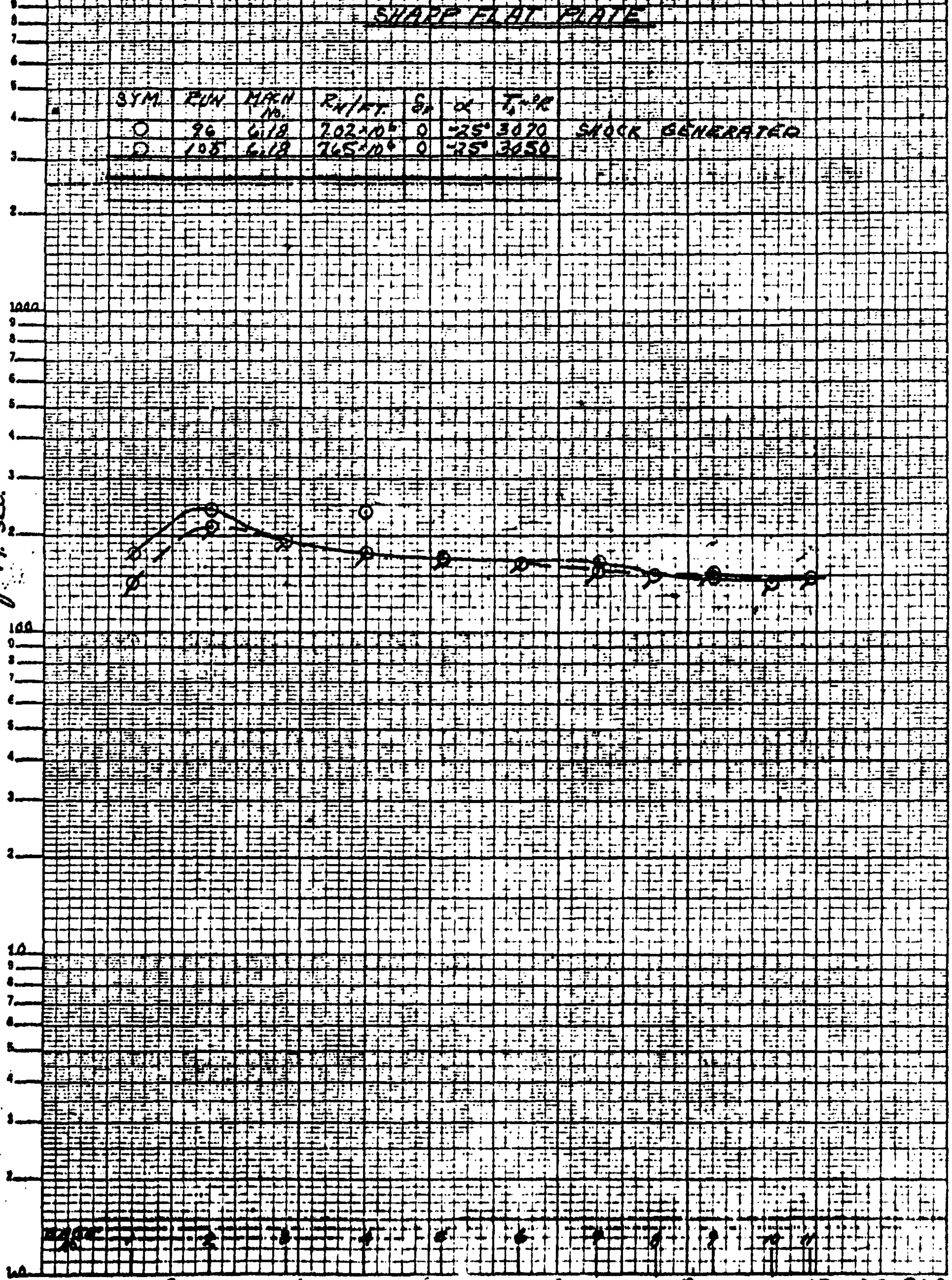
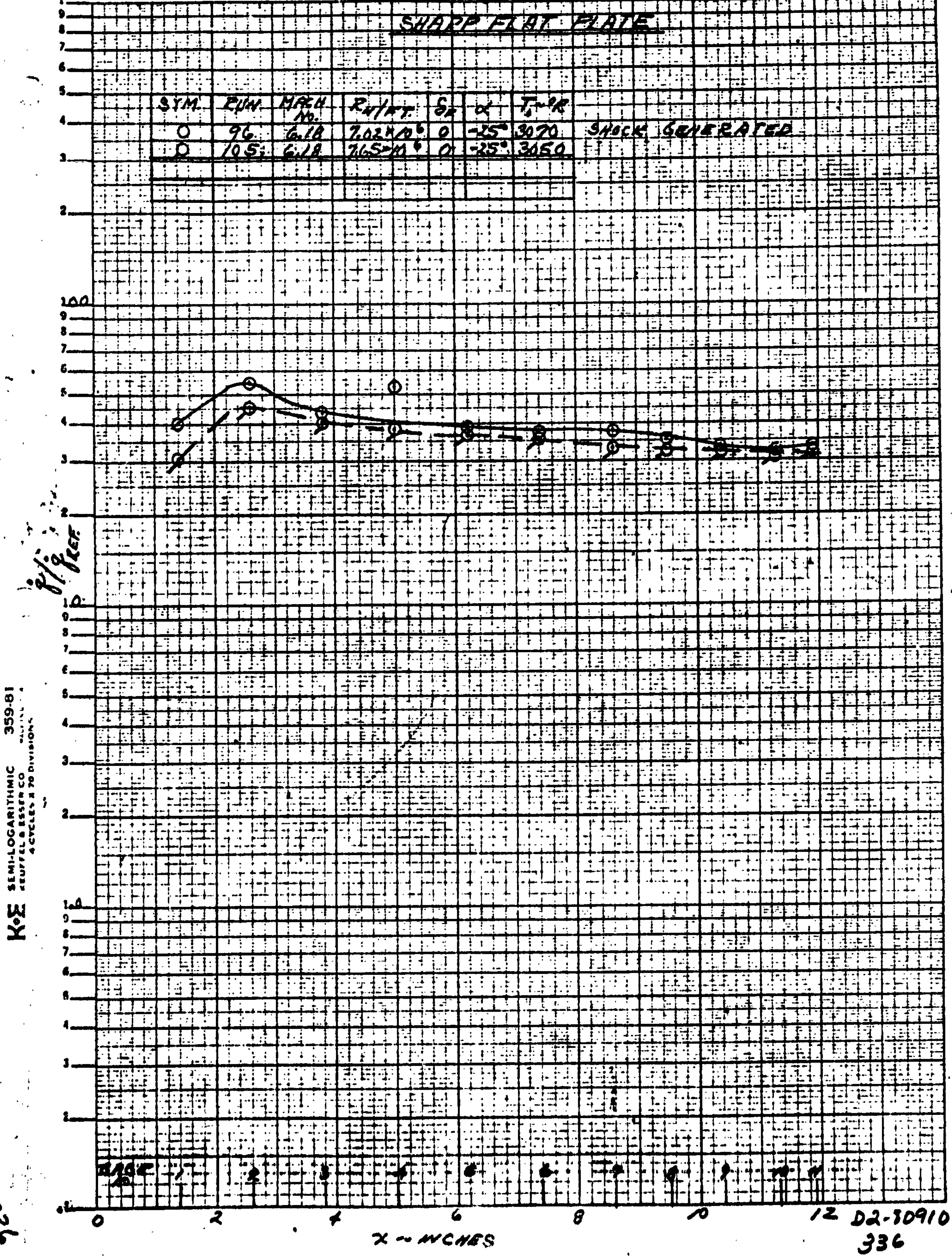

SHARP FLAT PLATE
SYM. RUN MACH No. R_N/FT. δ_F α T_1~°R
○ 96 6.18 7.02×10⁶ 0 -25° 3070 SHOCK GENERATED
◻ 105 6.18 7.65×10⁶ 0 -25° 3060
P_m/P_0
GAGE No.
1 2 3 4 5 6 7 8 9 10 11
0 2 4 6 8 10 12
x ~ INCHES
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 42 C



K+E SEMI-LOGARITHMIC 359-81 KEUFFEL & ESSER CO. 4 CYCLES X 70 DIVISIONS

FIG. 42 d



SHARP FLAT PLATE
SYM. RUN MACH No. R_N/FT. δ_F α T_0 ~°R
○ 96 6.18 7.02×10^6 0 -25° 3070
○ 105 6.18 7.65×10^6 0 -25° 3050
SHOCK GENERATED
q/q REF.
X ~ INCHES
K&E SEMI-LOGARITHMIC 359-81

EFFECT OF REYNOLDS NUMBER VARIATION ON A BLUNT FLAT PLATE

Figure 43

FIG. 43a.

BLUNT FLAT PLATE

SYM	RUN	MACH NO.	R_N/FT.	δ_F	α	T_0-°R
○	97	6.38	12.80×10⁶	0	-15°	2090
□	98	6.18	7.15×10⁶	0	-15°	3080
◇	97	5.94	4.02×10⁶	0	-15°	4220

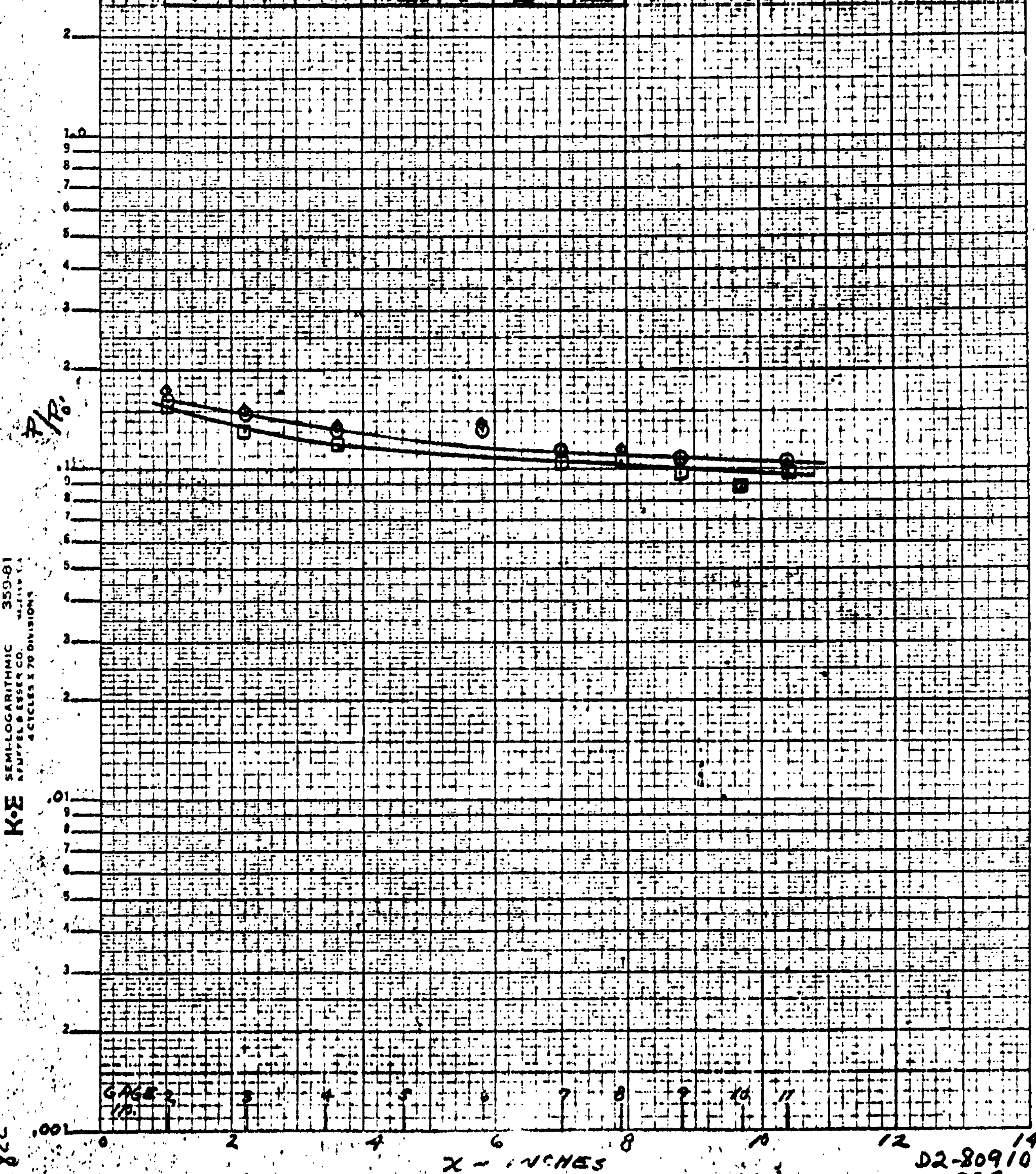


FIG. 43b.

BLUNT FLAT PLATE

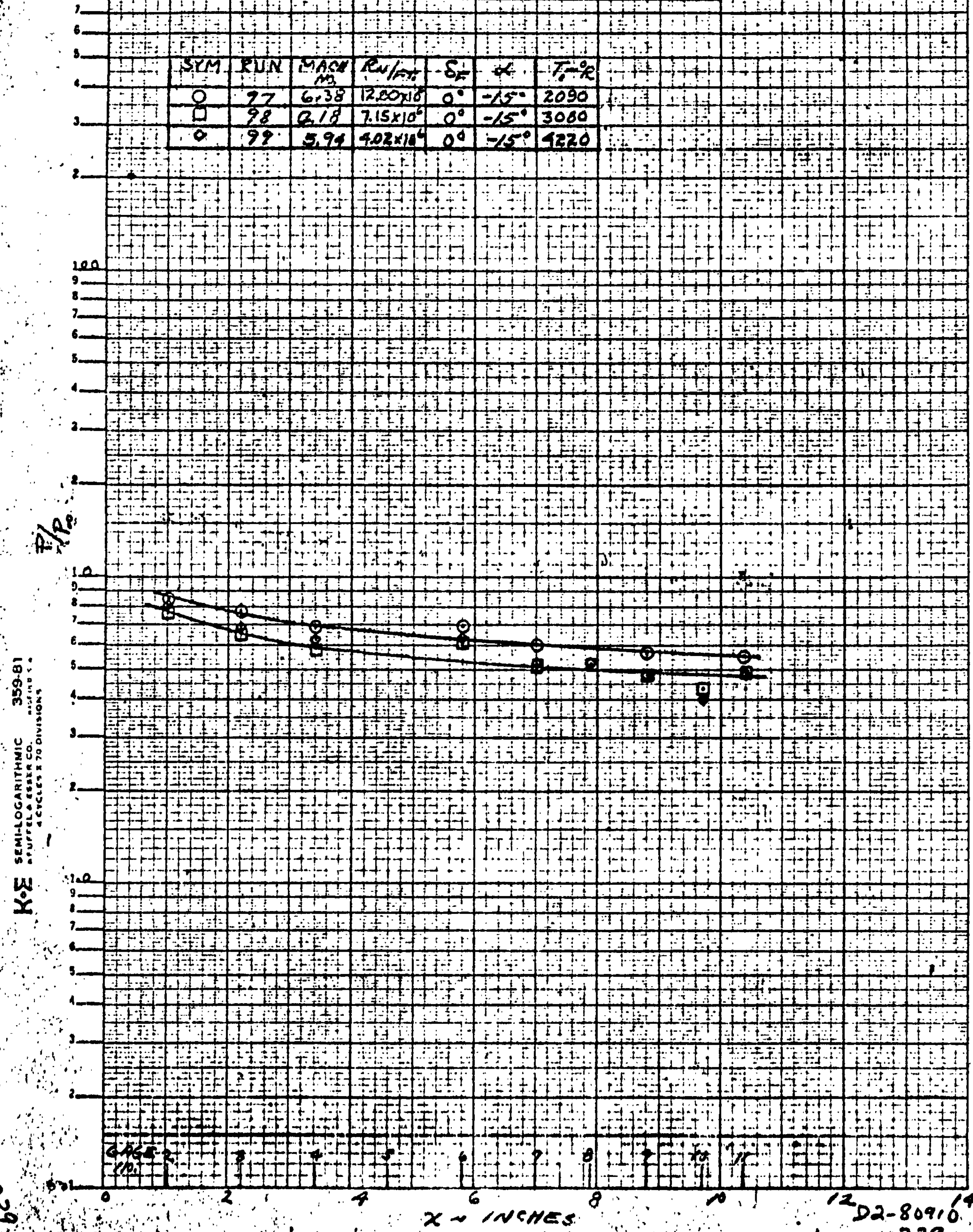


FIG. 43c

BLUNT FLAT PLATE

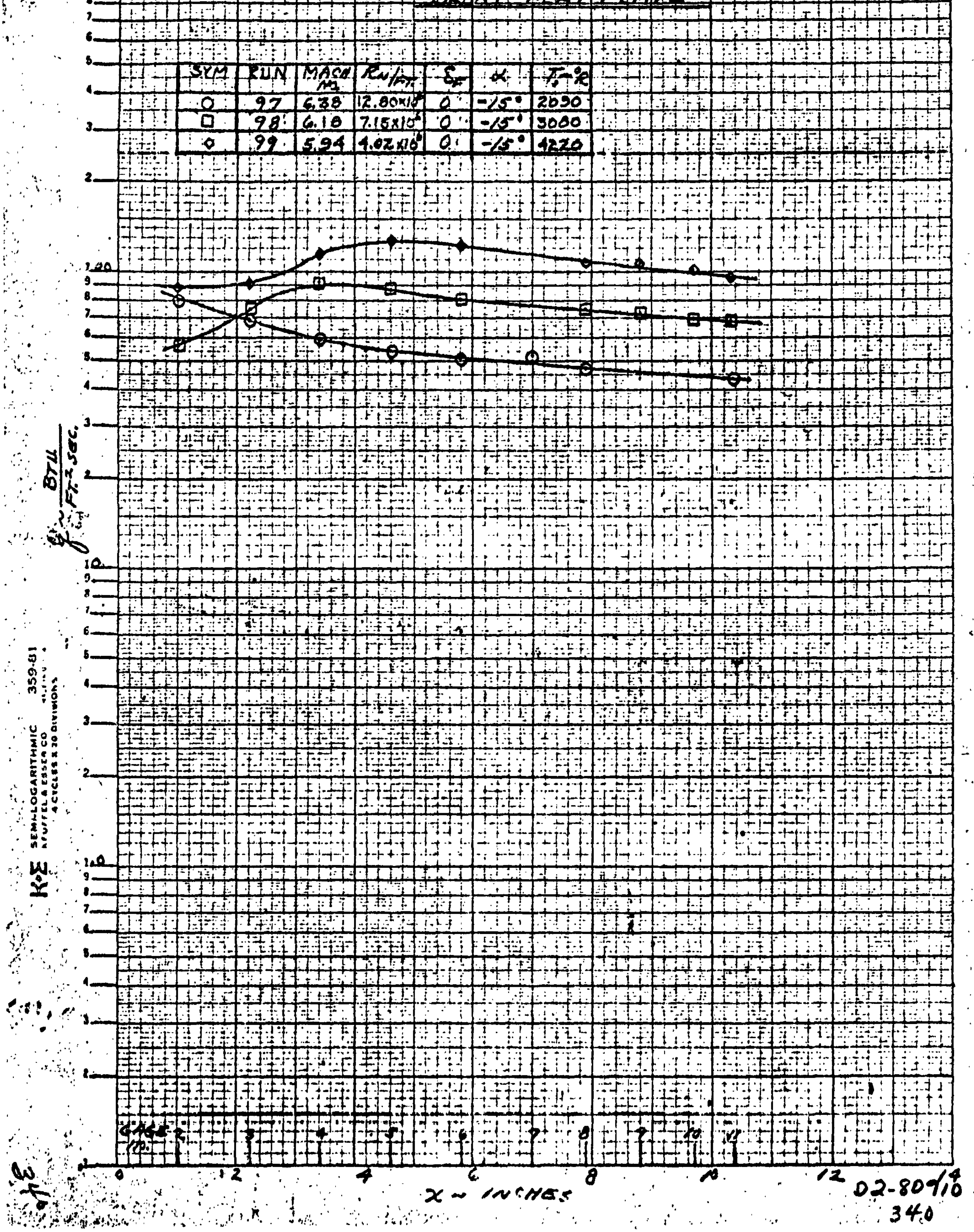
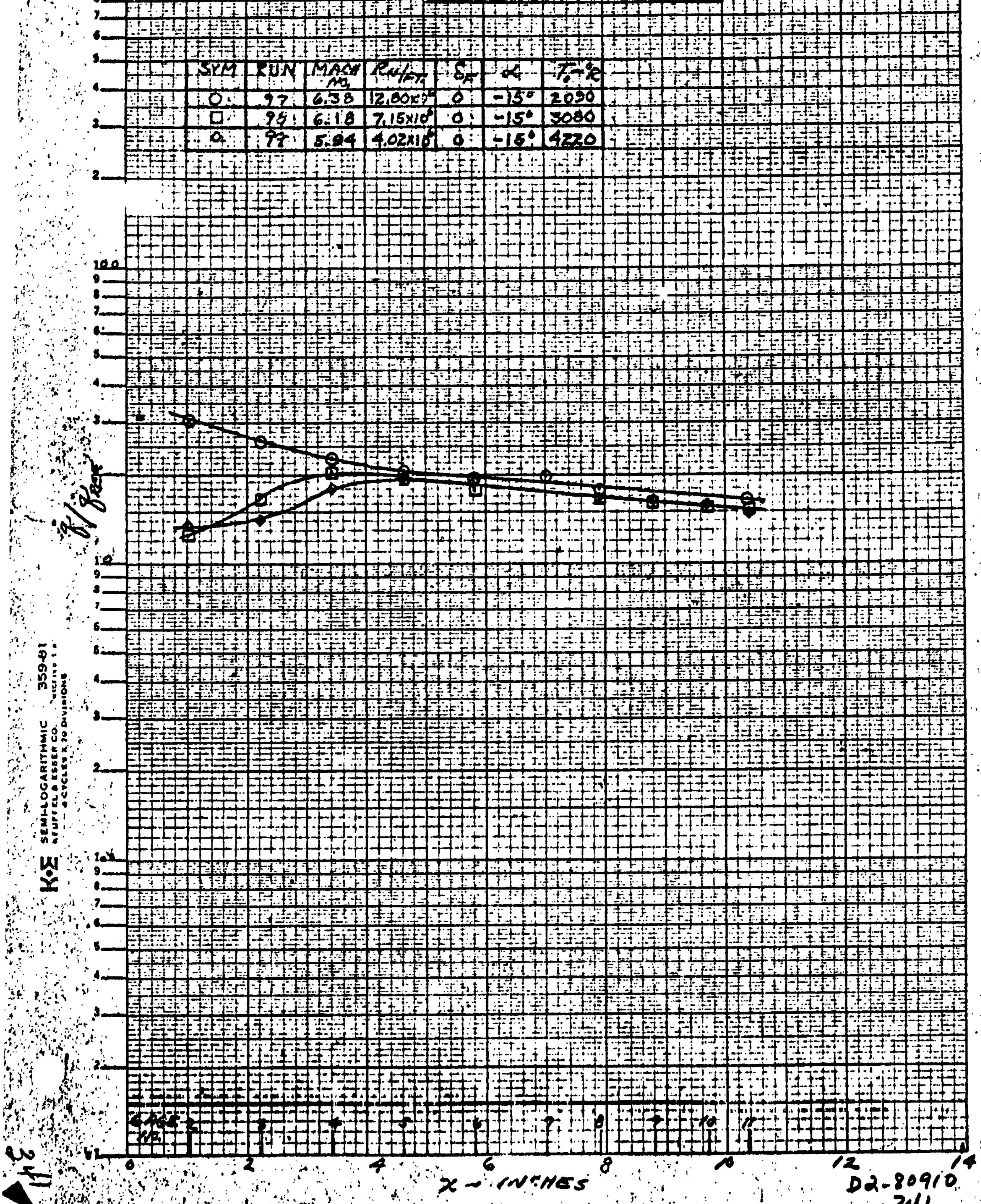


FIG. 432

BLUNT FLAT PLATE



EFFECT OF LEADING EDGE BLUNTNESS ON PRESSURE
AND HEAT TRANSFER DISTRIBUTIONS ON A FLAT PLATE

$\alpha = -15^{\circ}$
$M_{\infty} = 6.4$
$R_N/ft = 14 \times 10^6$

Figure 44

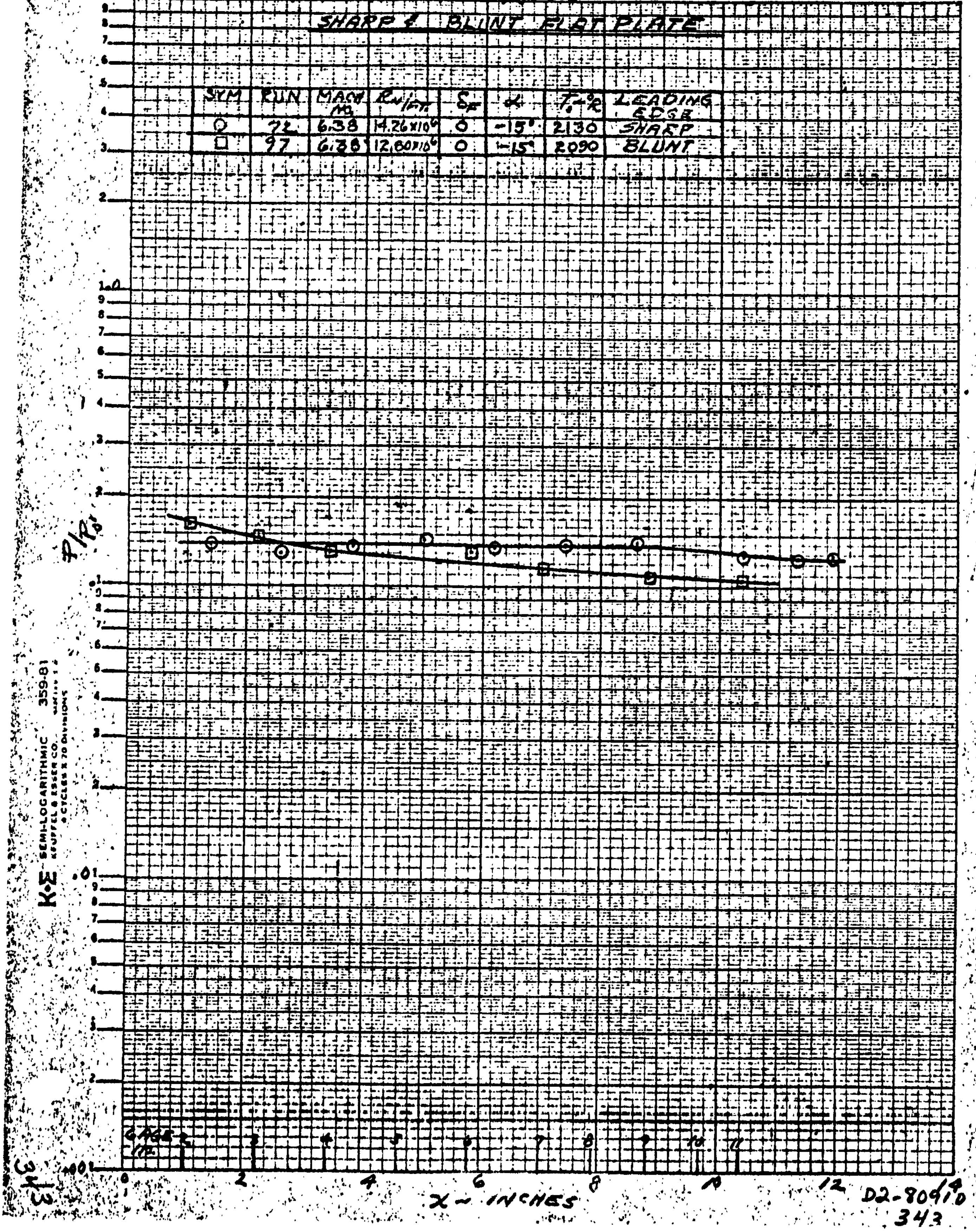
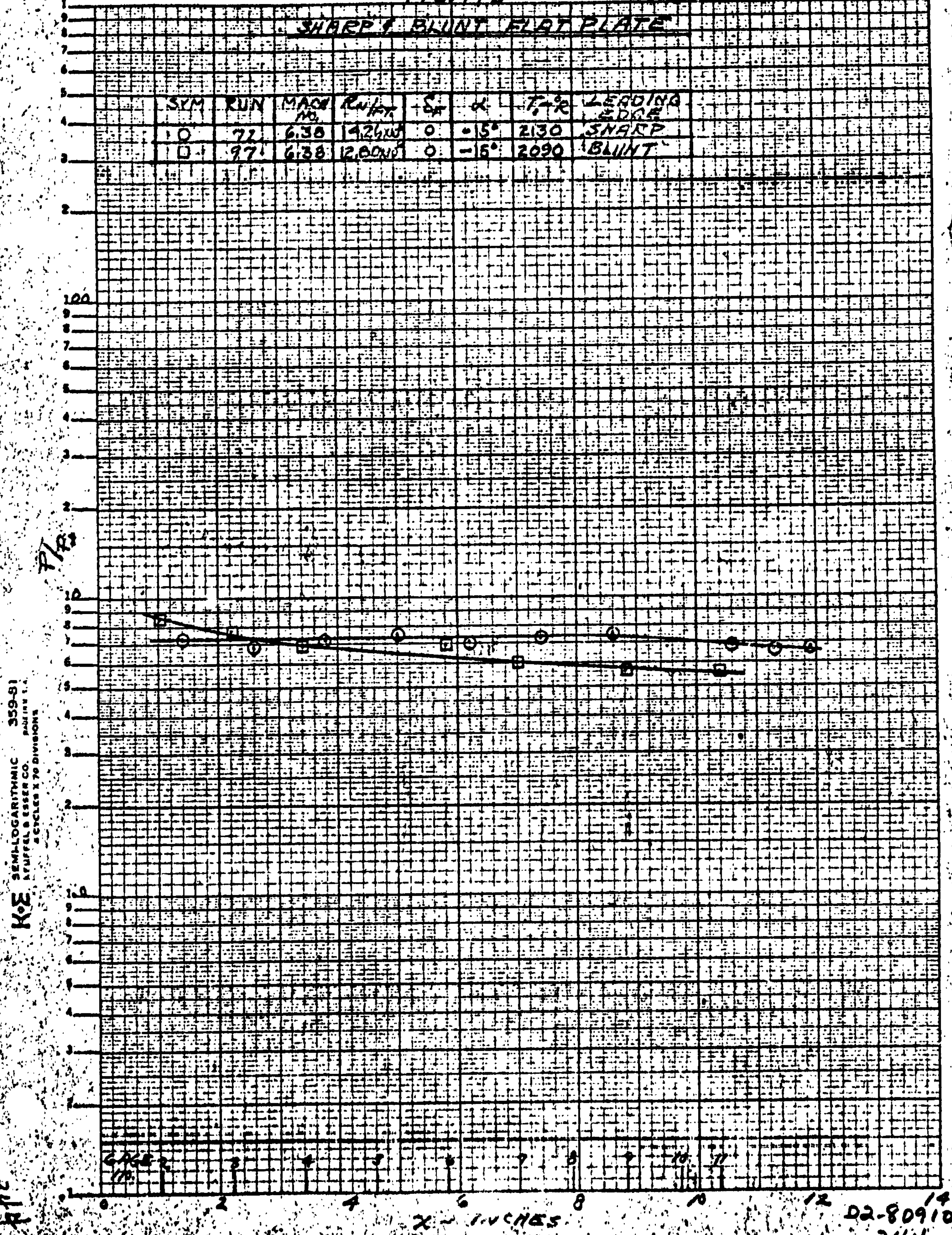

SHARP & BLUNT FLAT PLATE
SYM | RUN | MACH NO. | R_N/FT | δ_F | α | T_0 °R | LEADING EDGE
○ | 72 | 6.38 | 14.26×10^6 | 0 | -15° | 2130 | SHARP
□ | 97 | 6.38 | 12.60×10^6 | 0 | -15° | 2090 | BLUNT
$P/P_{0'}$
GAGE NO.
X ~ INCHES
K·E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
5 CYCLES X 70 DIVISIONS

FIG. 44a

FIG. 44b



SHARP & BLUNT FLAT PLATE
SYM RUN MACH NO. R_N/FT. δ_F α T_t °R LEADING EDGE
○ 72 6.38 1.426×10^6 0 -15° 2130 SHARP
□ 97 6.38 1.280×10^6 0 -15° 2090 BLUNT
P/PT
X ~ INCHES
GAGE NO.
K&E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

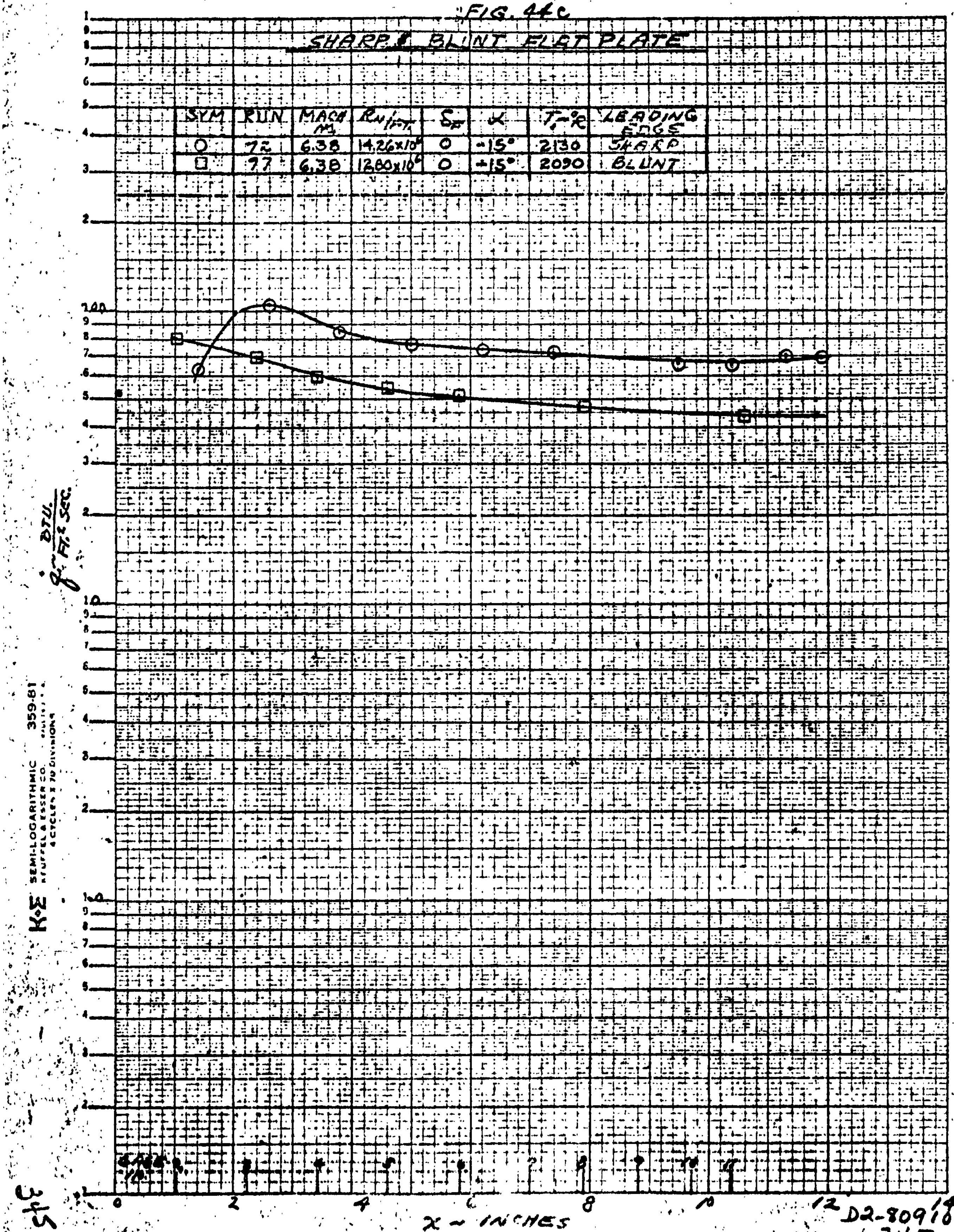
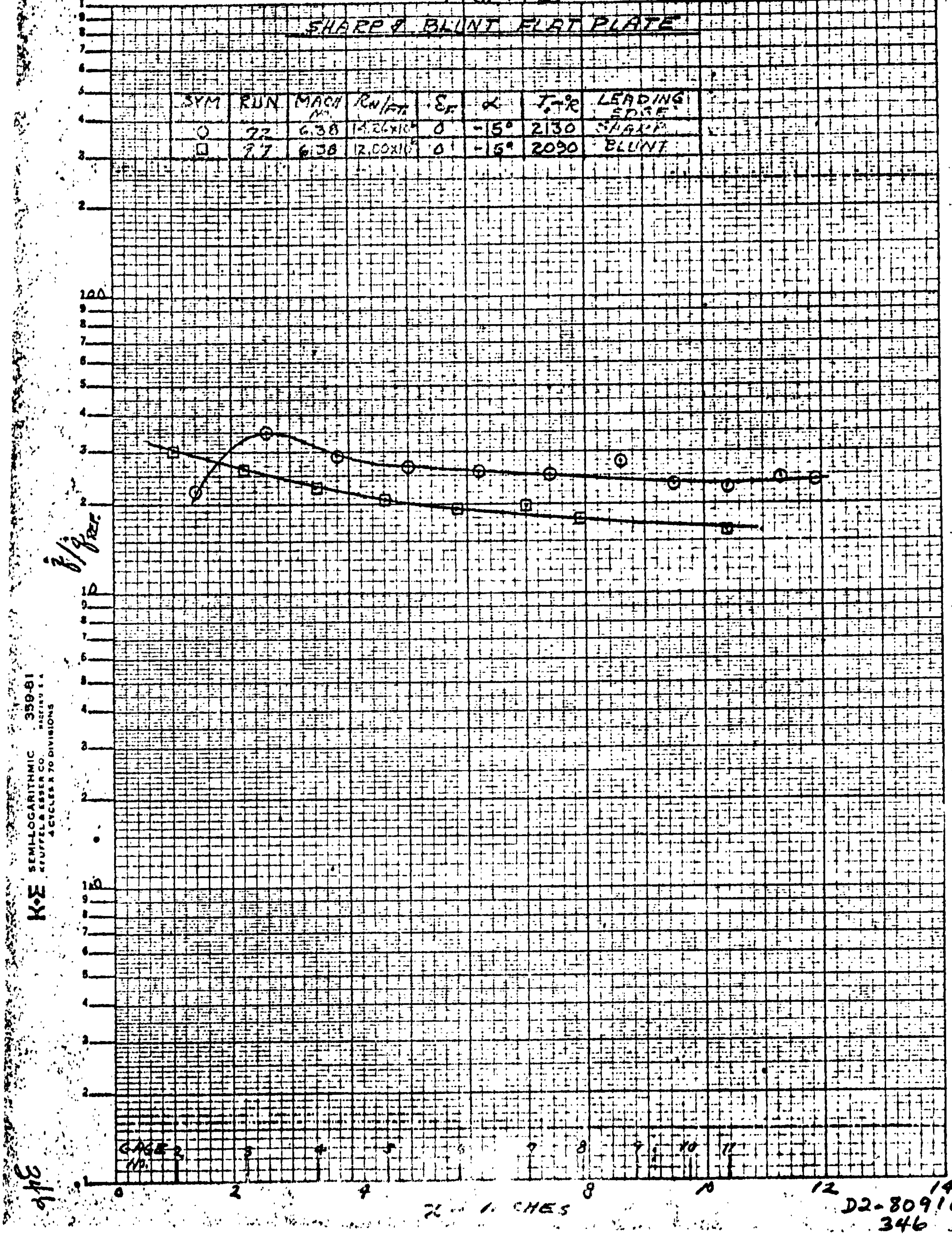


FIG. 44c
SHARP & BLUNT FLAT PLATE
SYM | RUN | MACH M | R_N/FT. | δ_F | α | T_t ~ °R | LEADING EDGE
○ | 72 | 6.38 | 14.26x10⁶ | 0 | -15° | 2130 | SHARP
□ | 77 | 6.38 | 12.80x10⁶ | 0 | -15° | 2090 | BLUNT
$\dot{q}$ ~ BTU/FT.² SEC.
x ~ INCHES
0
2
4
6
8
10
12
14
10.0
1.0
KE SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
4 CYCLES X 70 DIVISIONS

FIG. 44d



SHARP & BLUNT FLAT PLATE
SYM RUN MACH NO. $R_N/FT.$ ε_F α T_0 °R LEADING EDGE
○ 72 6.38 14.26x10^6 0 -15° 2130 SHARP
□ 77 6.38 12.00x10^6 0 -15° 2090 BLUNT
$\dot{q}/\dot{q}_{REF.}$
GAGE NO. 2 3 4 5 6 7 8 9 10 11
0 2 4 6 8 10 12 14
X - INCHES
K&E SEMI-LOGARITHMIC 359-81 KEUFFEL & ESSER CO. 4 CYCLES X 70 DIVISIONS

EFFECT OF LEADING EDGE BLUNTNESS ON THE PRESSURE
AND HEAT TRANSFER DISTRIBUTIONS ON A FLAT PLATE

$\alpha = -15^{\circ}$
$M_{\infty} = 6.2$
$R_N/ft = 7 \times 10^6$

Figure 45

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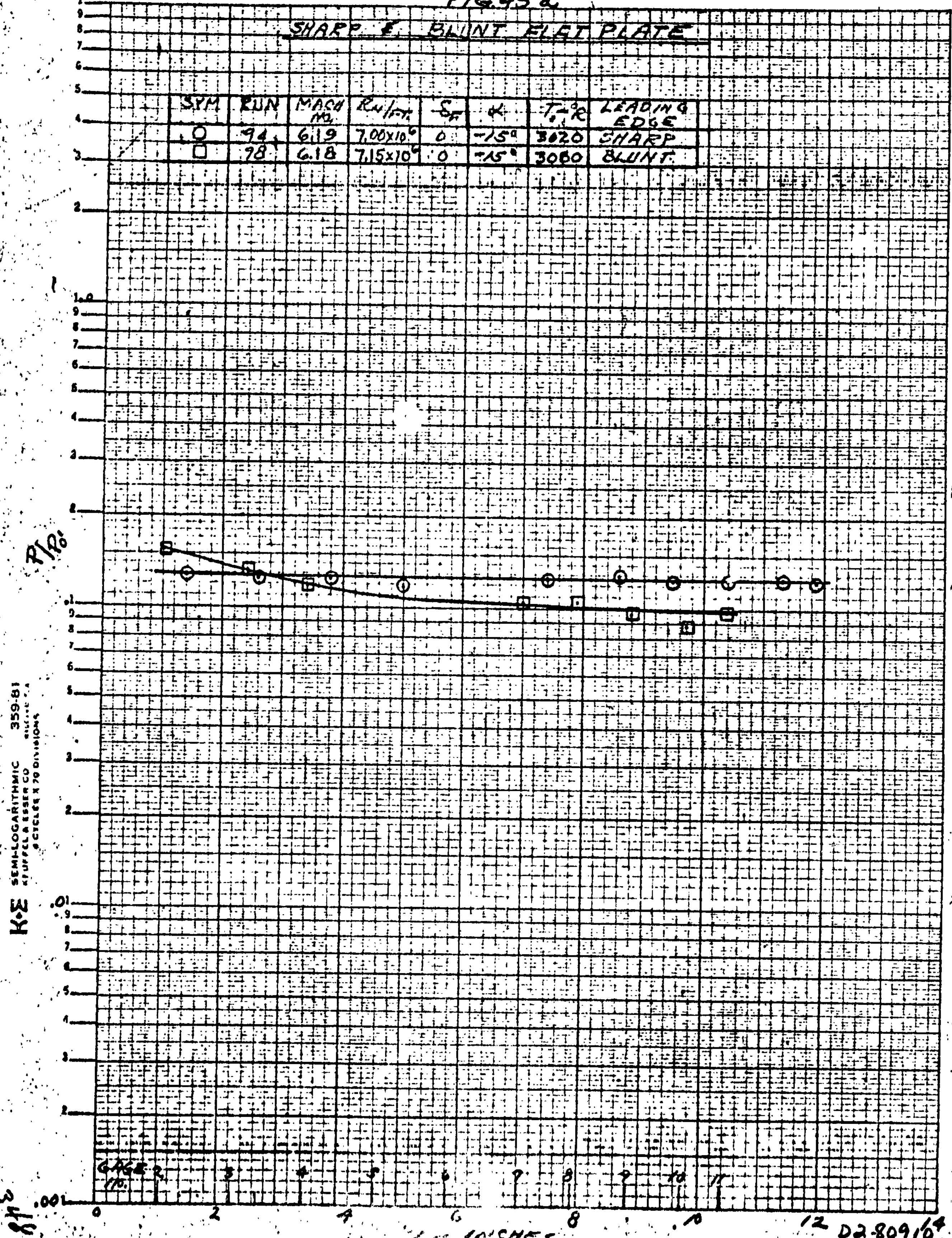
FIG. 45a



D2-80916-4
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Fig. 45b

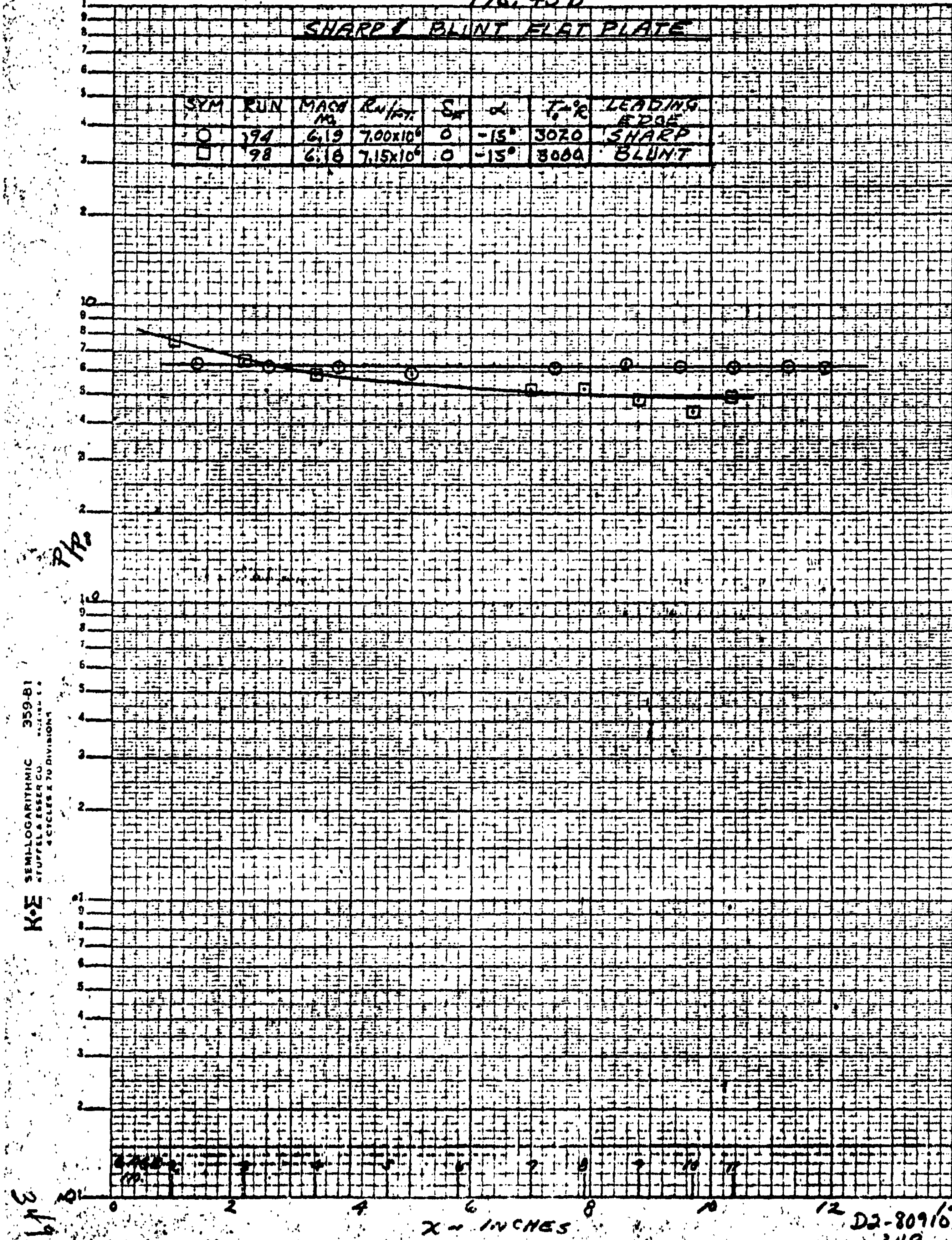
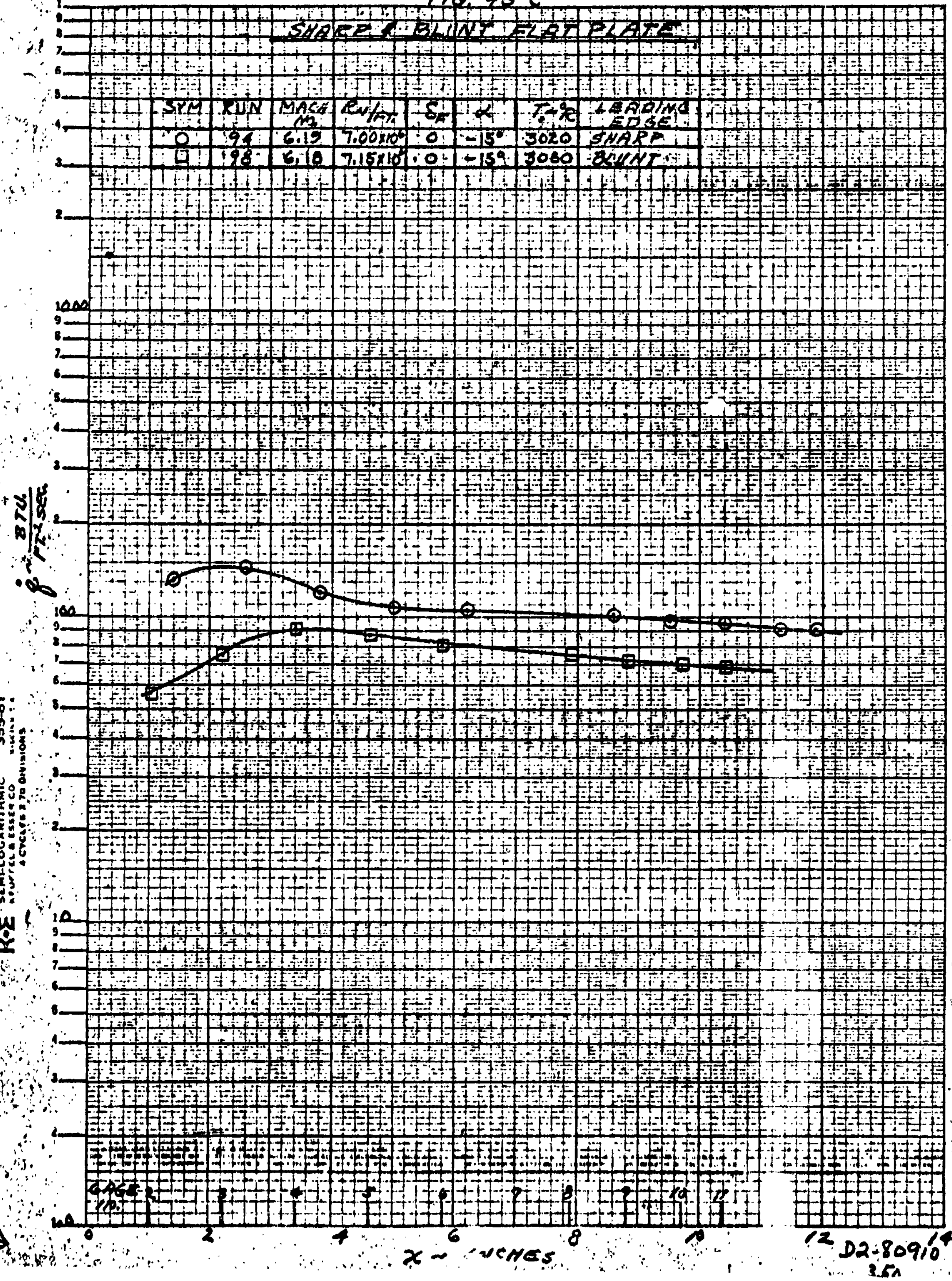
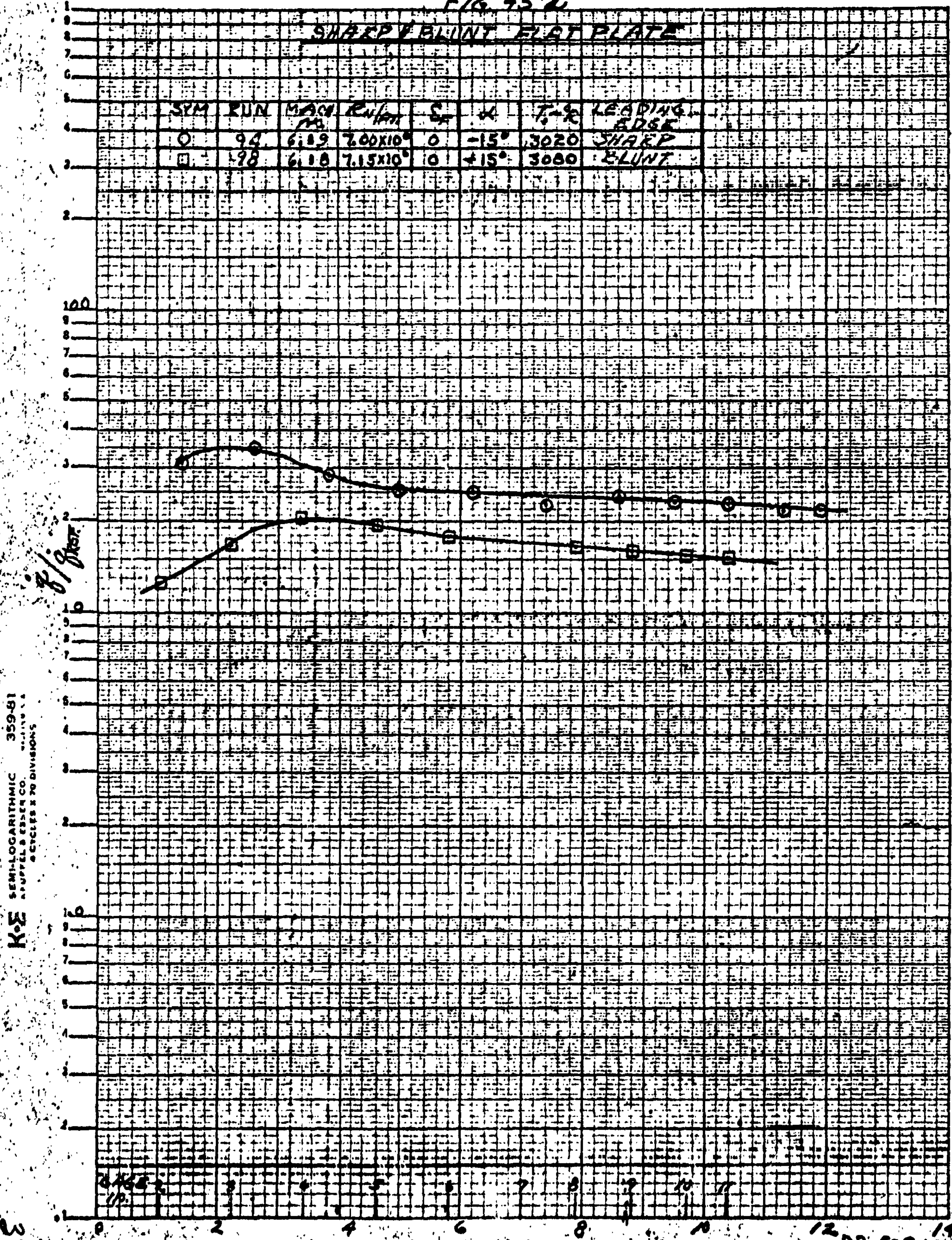

SHARP & BLUNT FLAT PLATE
SYM RUN MACH M_∞ R_n/FT. δ_F α T_0 °R LEADING EDGE
○ 194 6.19 7.00x10^6 0 -15° 3020 SHARP
□ 98 6.18 7.15x10^6 0 -15° 3000 BLUNT
P/P∞
x ~ INCHES
K·E SEMI-LOGARITHMIC 359-81

FIG. 45 C



D2-80910

FIG. 45 L


SHARP V BLUNT FLAT PLATE
SYM RUN MACH NO. R_N/FT. δ_F α T_o - °R LEADING EDGE
○ 94 6.19 7.00X10⁶ 0 -15° 3020 SHARP
□ 98 6.18 7.15X10⁶ 0 +15° 3080 BLUNT
$q/q_{REF.}$
X ~ INCHES
0 2 4 6 8 10 12 14
GAGE 1P. 2 3 4 5 6 7 8 9 10 11
100
1.0
K+E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

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EFFECT OF LEADING EDGE BLUNTNESS ON THE PRESSURE
AND HEAT TRANSFER DISTRIBUTIONS ON A FLAT PLATE

$\alpha = -15^\circ$
$M_\infty = 5.9$
$R_N/ft = 4 \times 10^6$

Figure 46

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FIG. 46a

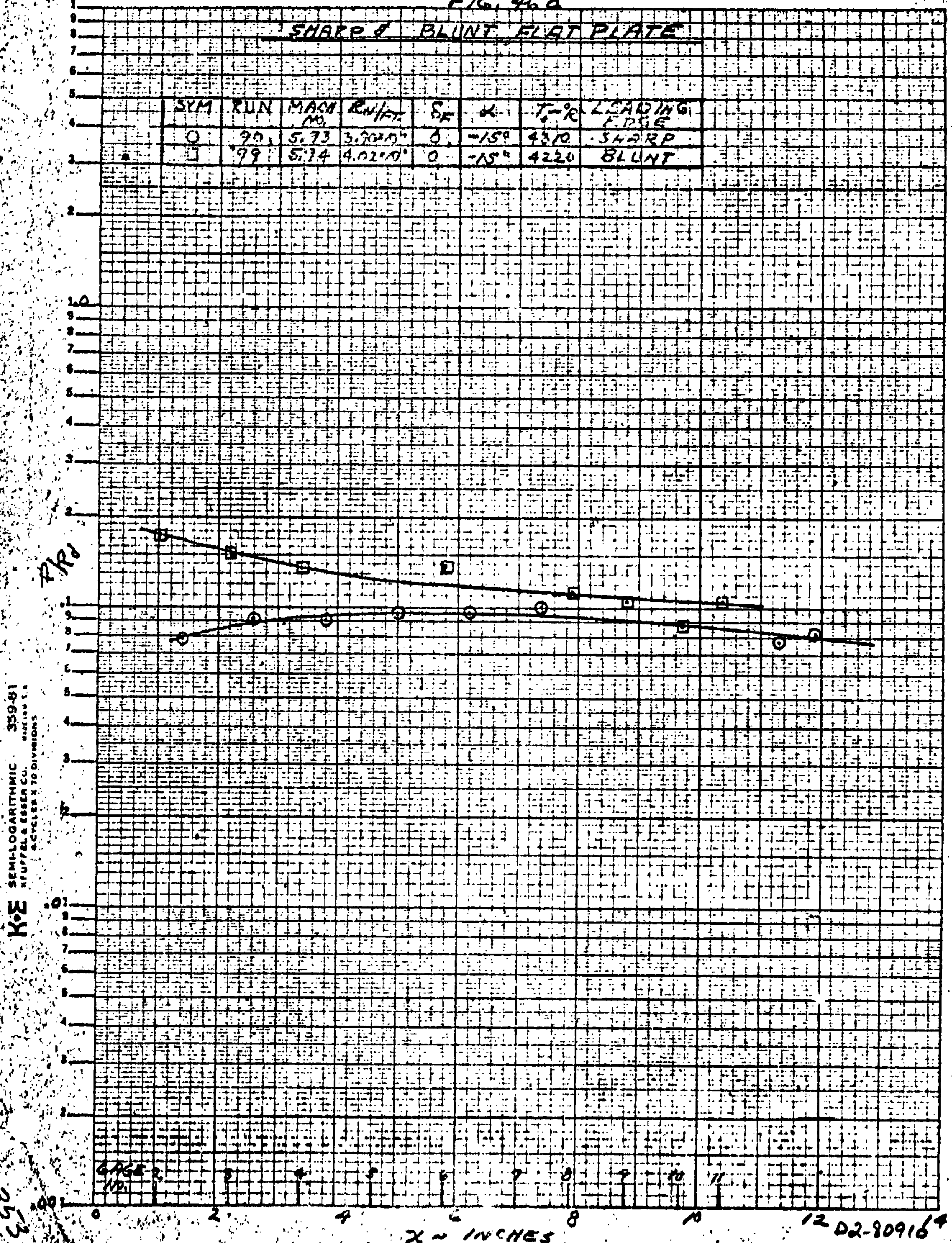

SHARP & BLUNT FLAT PLATE
SYM RUN MACH NO. R_N/FT. δ_F α T_t - °R LEADING EDGE
○ 90 5.73 3.90×10⁶ 0 -15° 4310 SHARP
□ 99 5.74 4.02×10⁶ 0 -15° 4220 BLUNT
$R_{R\delta}$
GAGE NO.
2 3 4 5 6 7 8 9 10 11
0 2 4 6 8 10 12 14
X ~ INCHES
K·E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

FIG. 46b

SHARP & BLUNT FLAT PLATE

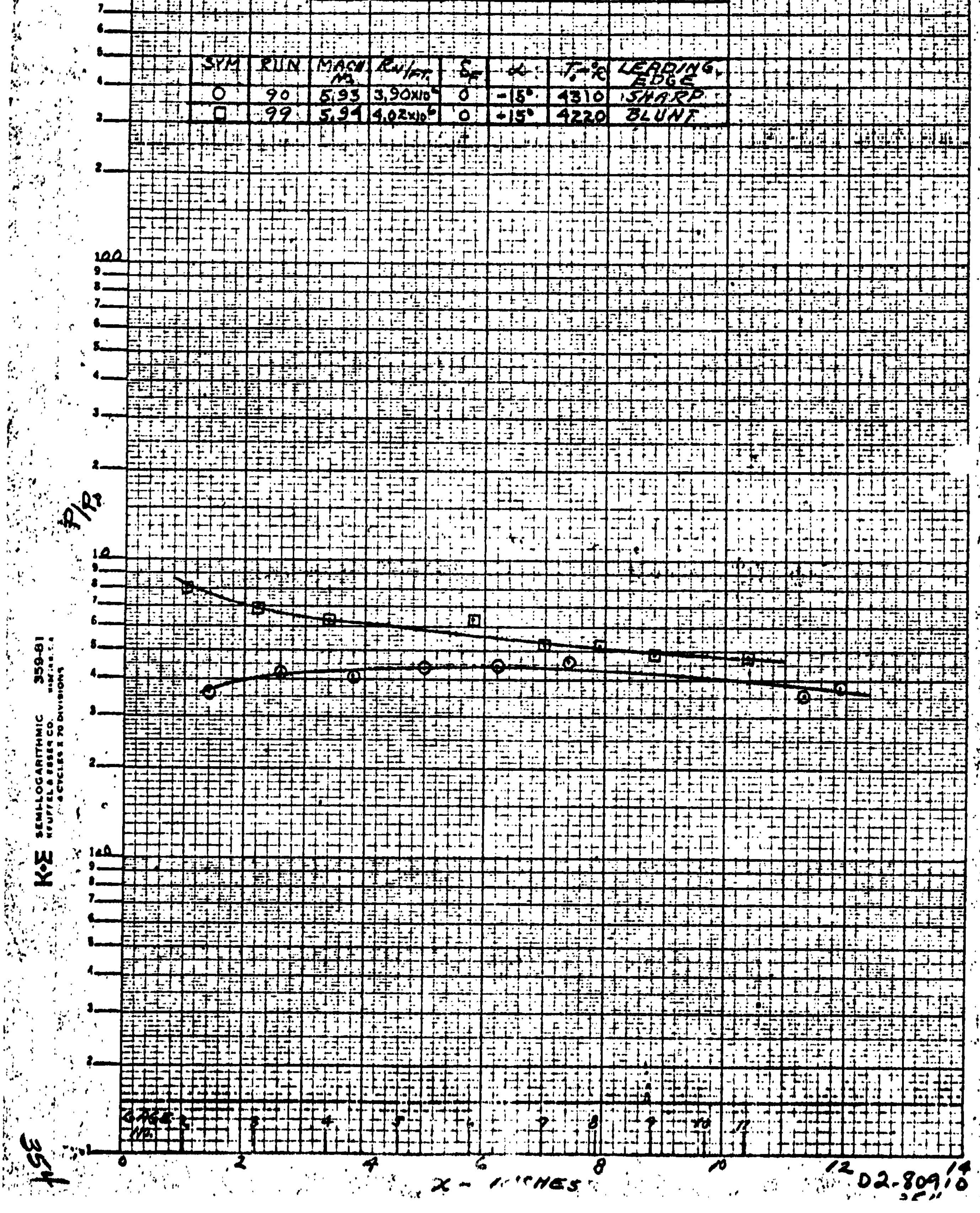
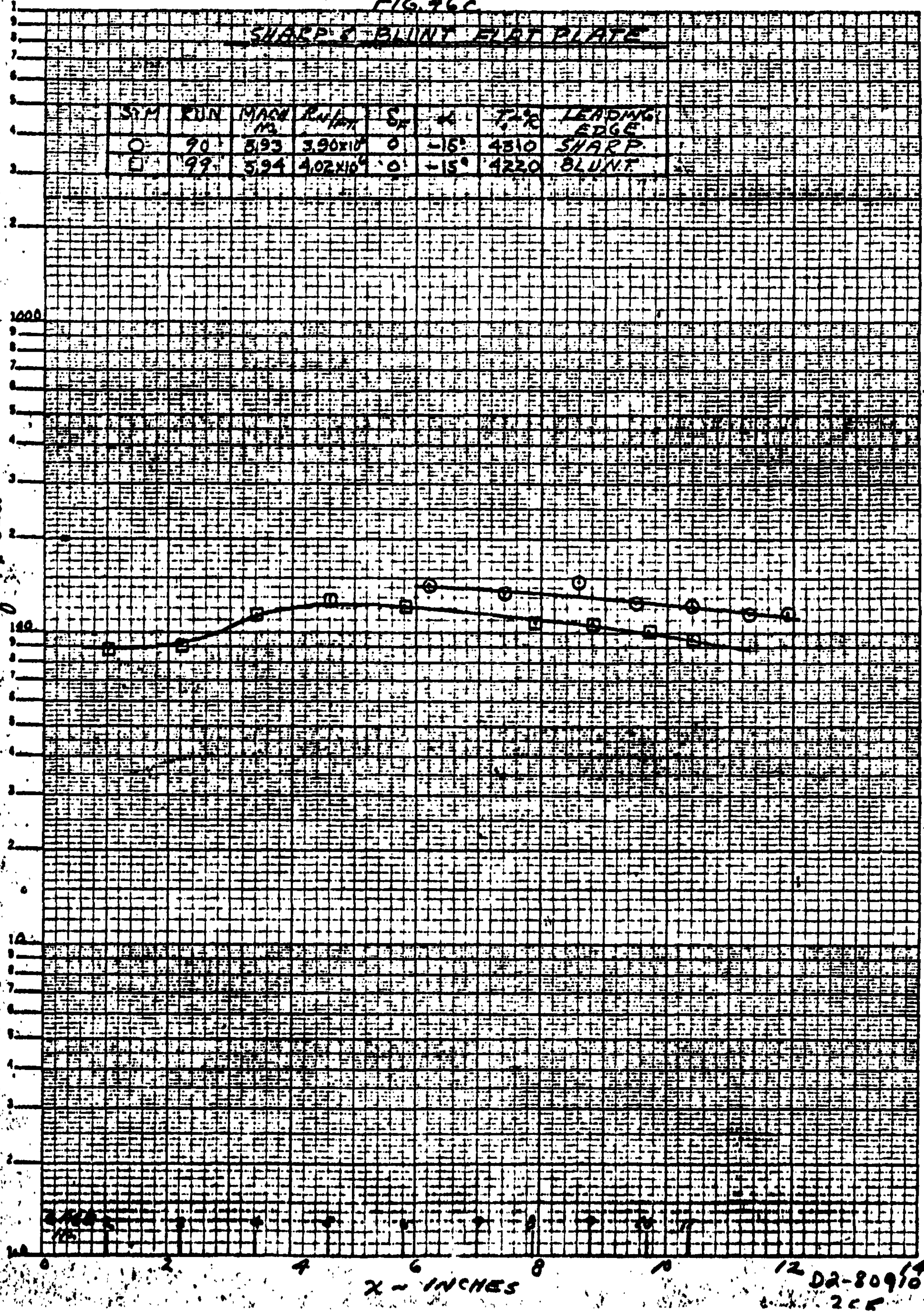


FIG. 46c

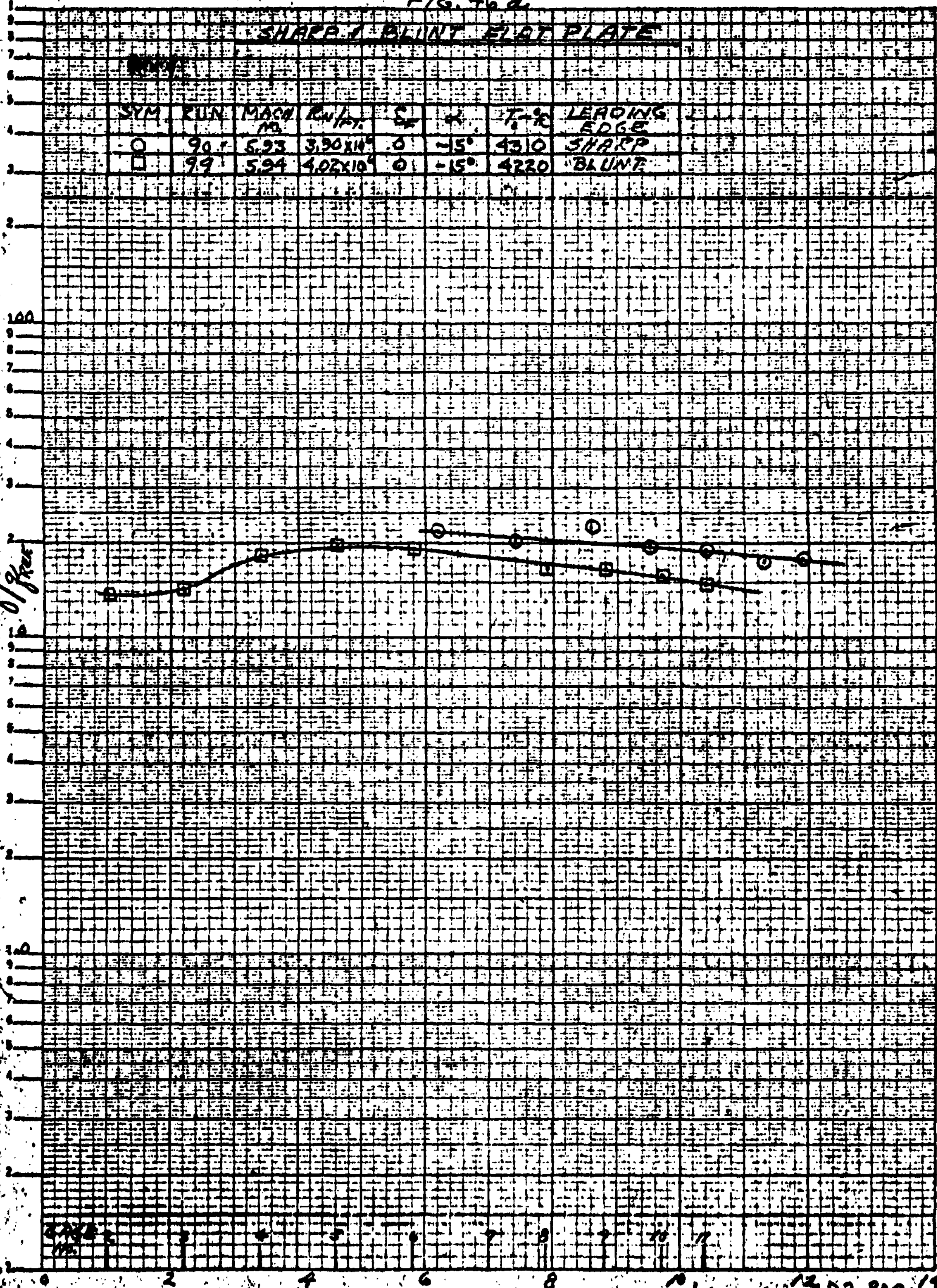


K·E SEMI-LOGARITHMIC 359-81 KEUFFEL & ESSER CO. 4 CYCLES X 70 DIVISIONS

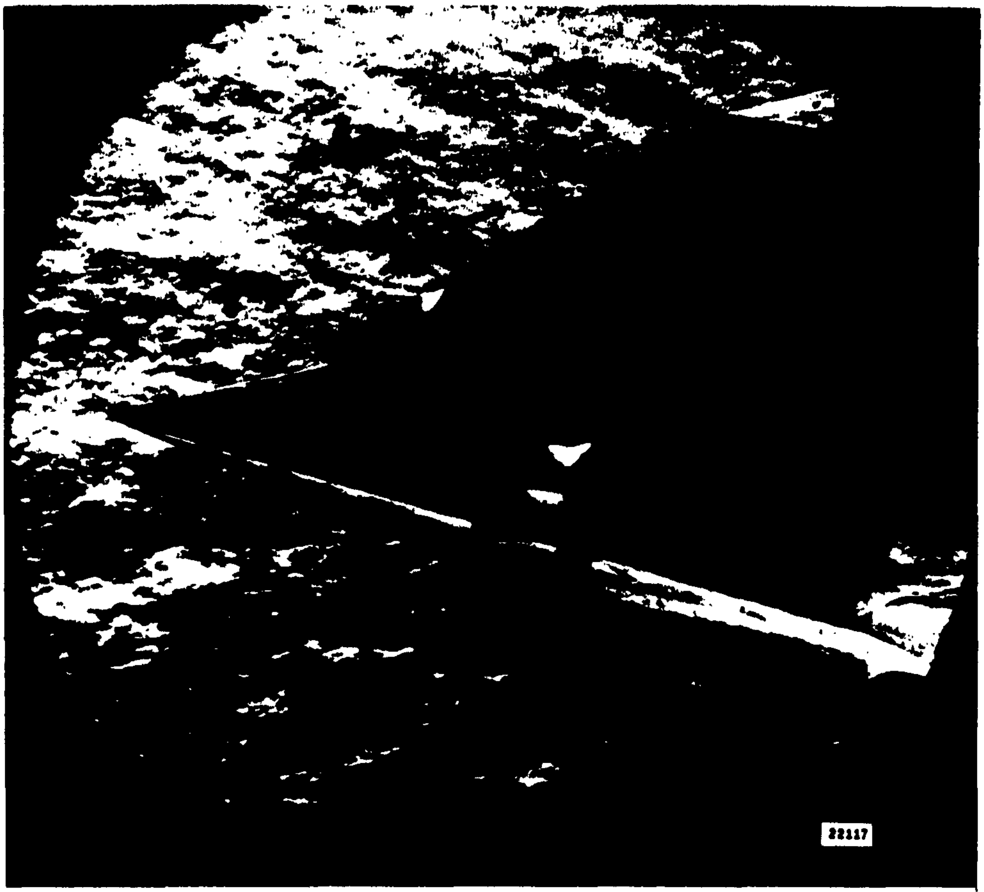
353

D2-80910
2CF

FIG. 46 d



SHARP & BLUNT FLAT PLATE
SYM RUN MACH NO. $R_N/FT.$ δ_F α T_0 °R LEADING EDGE
○ 90 5.93 3.90x10^6 0 -15° 4310 SHARP
□ 99 5.94 4.02x10^6 0 -15° 4220 BLUNT
q/q_free
X - INCHES
0 2 4 6 8 10 12
100
10
1.0
K·E SEMI-LOGARITHMIC 359-81
KEUFFEL & ESSER CO.
3 CYCLES X 70 DIVISIONS

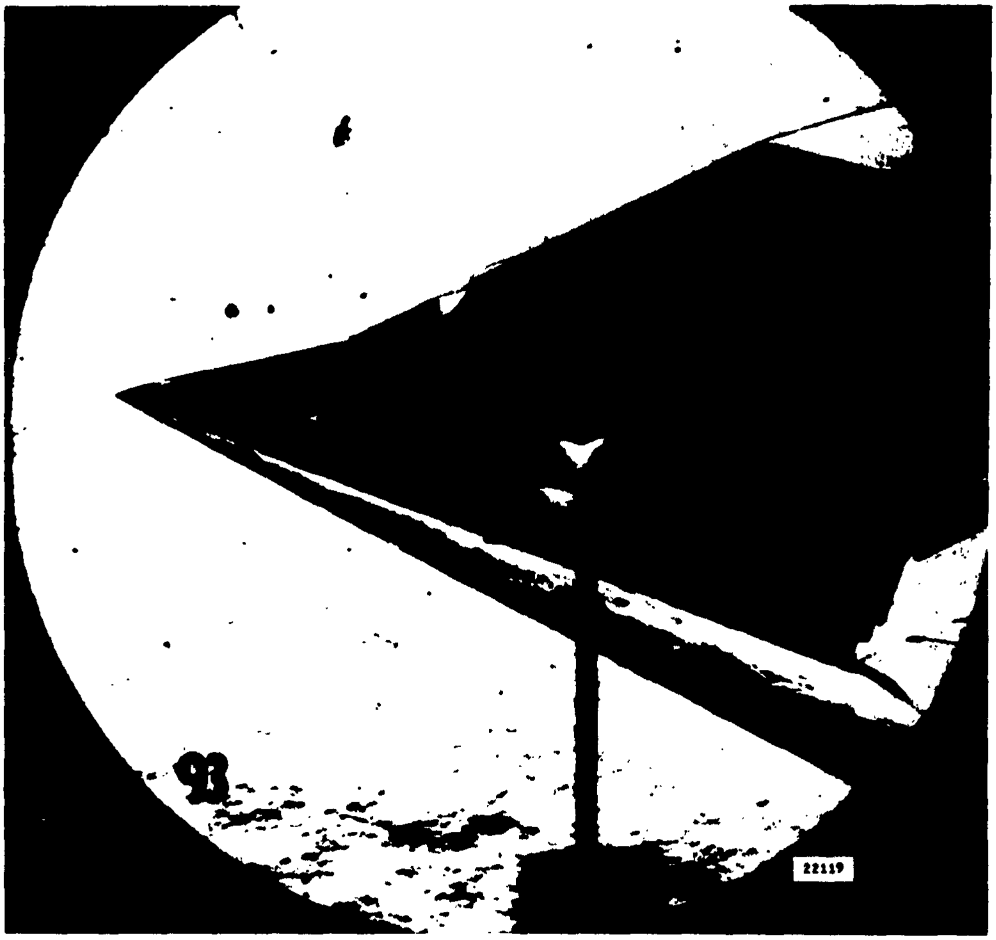


RUN 91

$\alpha = -15°$

SCHLIEREN PHOTOGRAPH

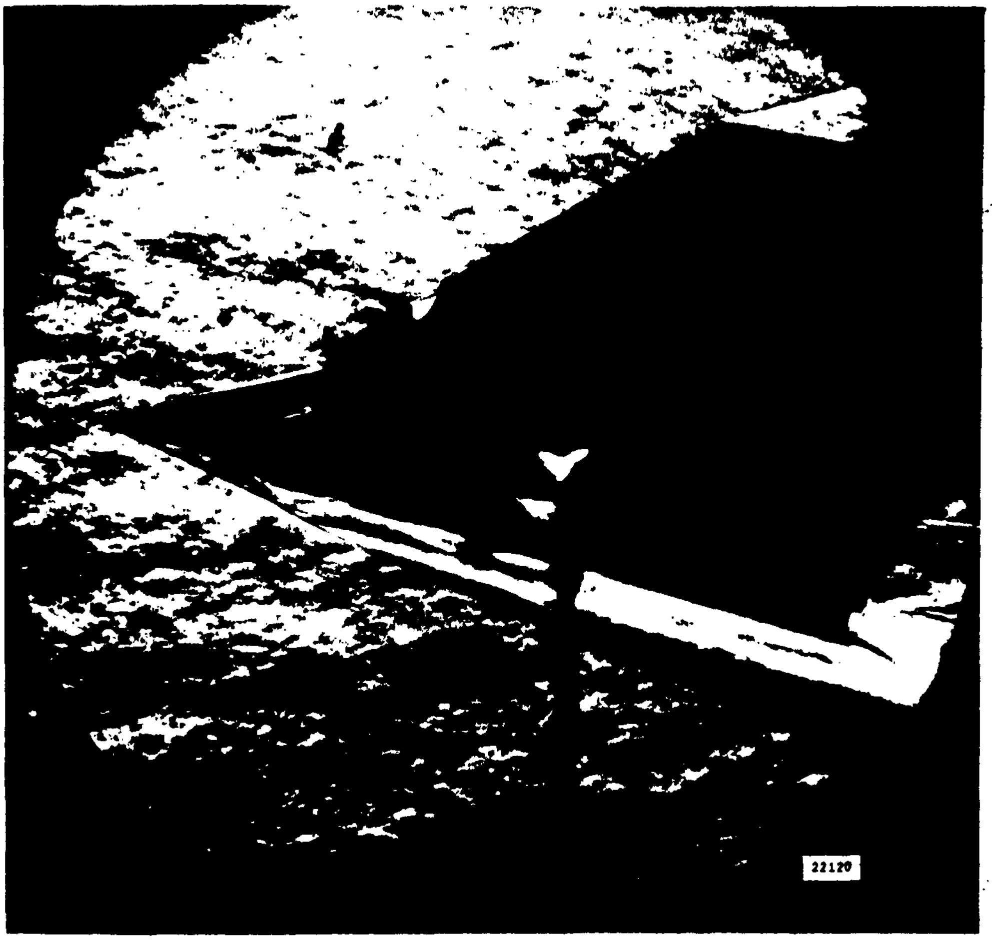
Figure 47



RUN 93 $\alpha = -20°$

SCHLIEREN PHOTOGRAPH

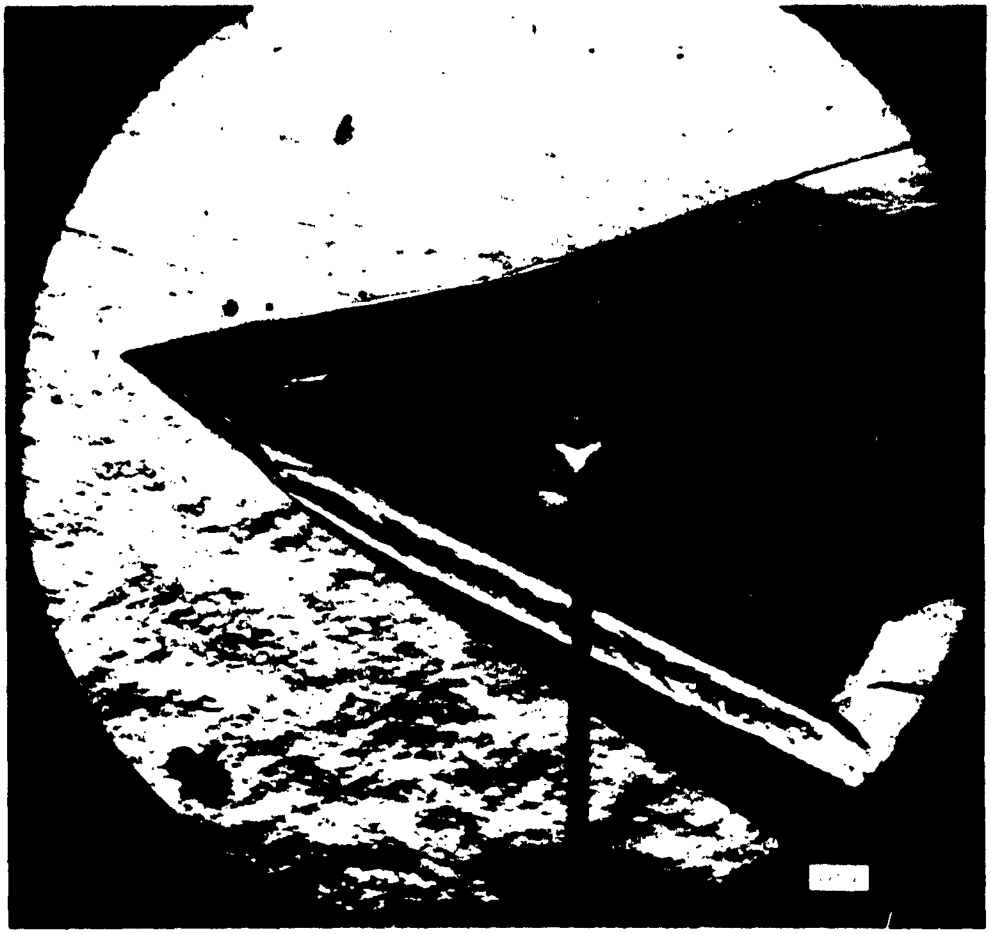
Figure 48



RUN 94 $\alpha = -15°$

SCHLIEREN PHOTOGRAPH

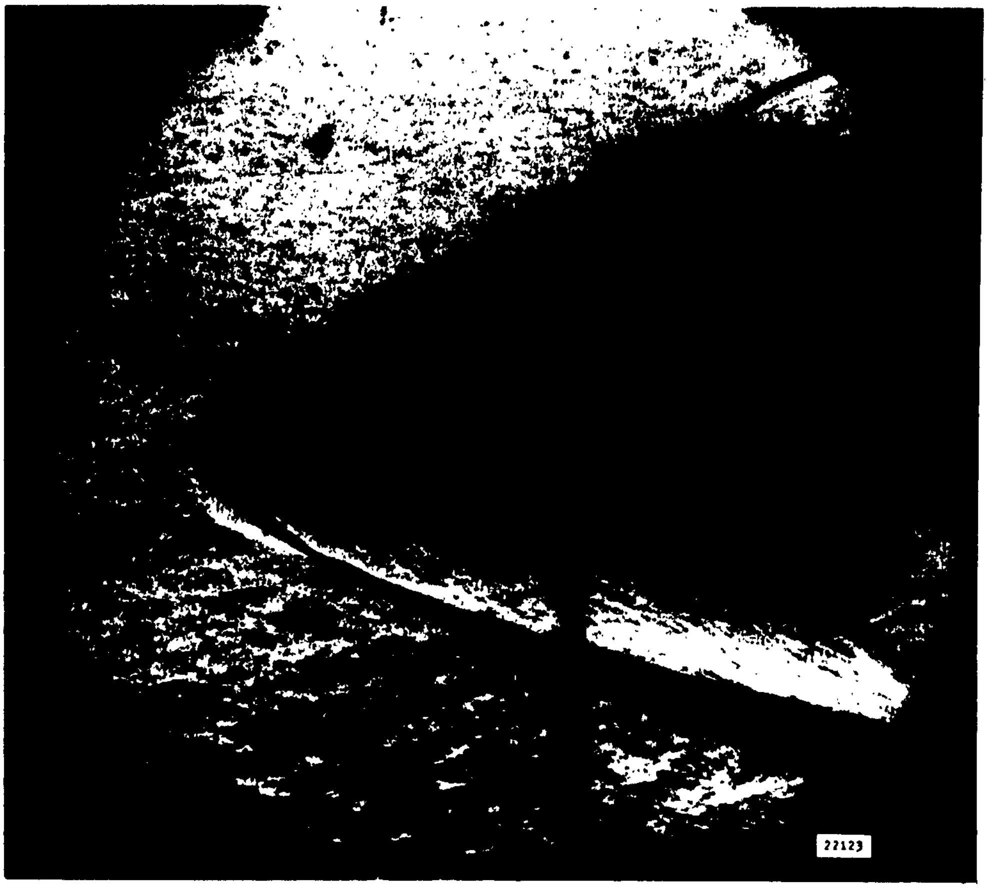
Figure 49



RUN 96 $\alpha = -25°$

SCHLIEREN PHOTOGRAPH

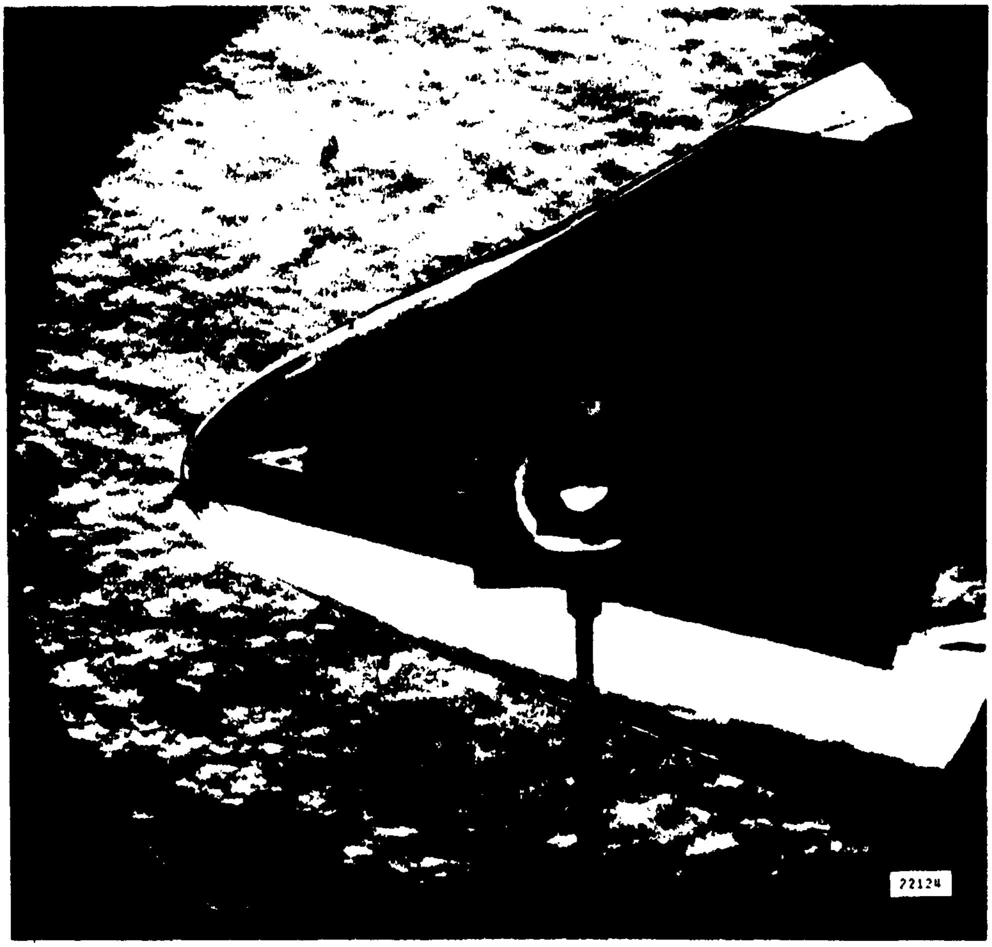
Figure 50



RUN 97 $\alpha = -15°$

SCHLIEREN PHOTOGRAPH

Figure 51



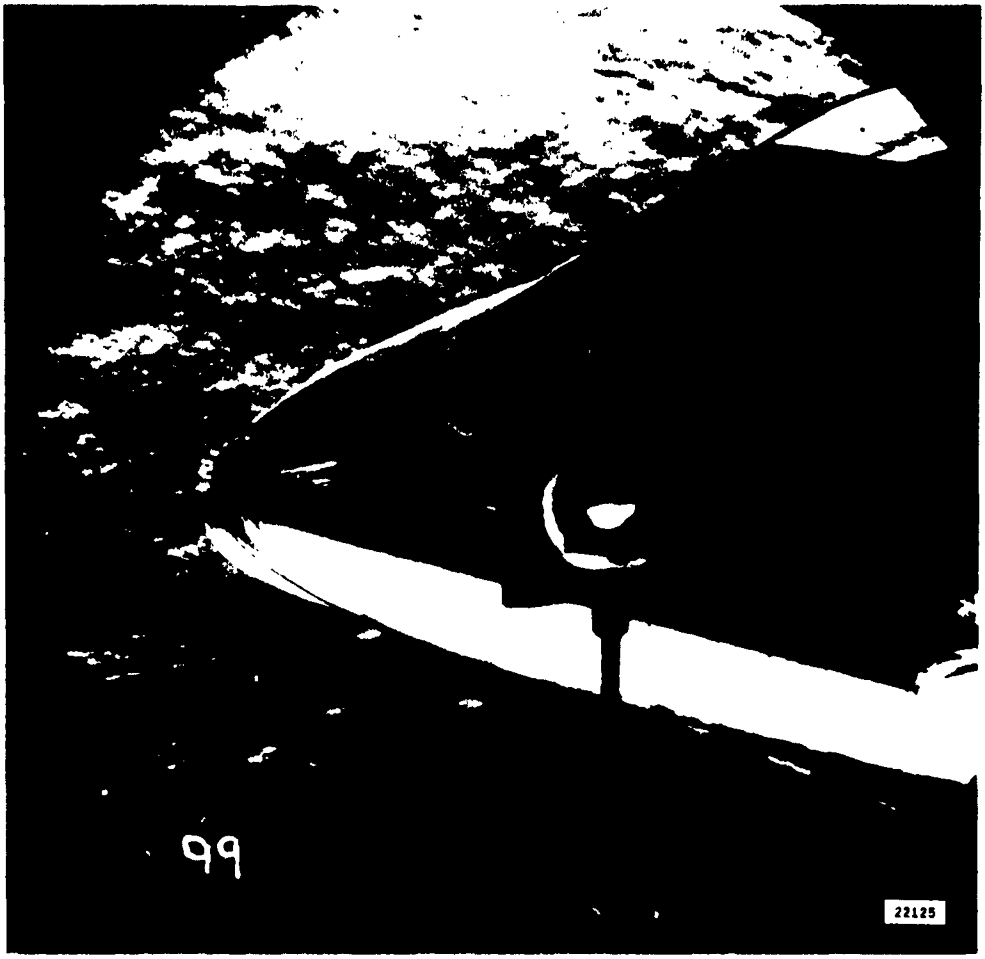
RUN 98

$\alpha = -15°$

SCHLIEREN PHOTOGRAPH

Figure 52

362



RUN 99 $\alpha = -15°$

SCHLIEREN PHOTOGRAPH

Figure 53

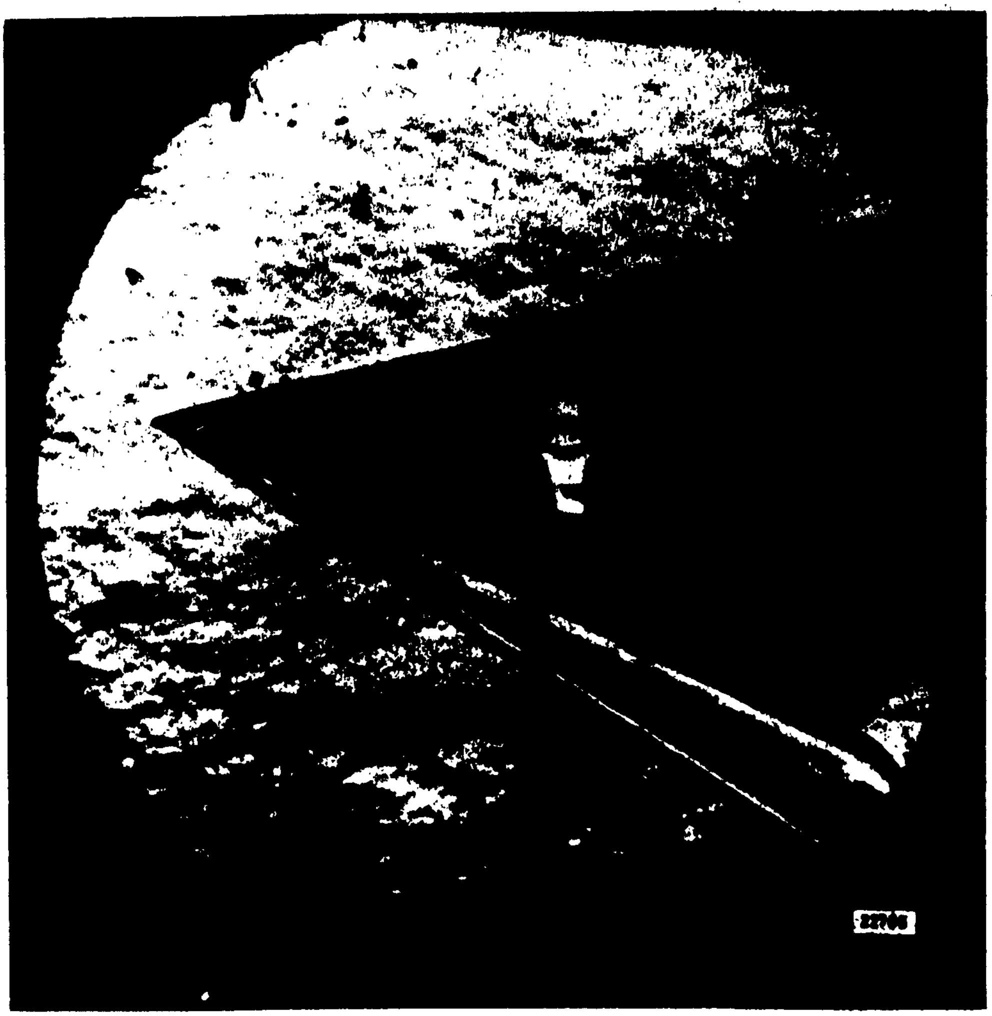
RUN 100 $\alpha = -15°$

SCHLIEREN PHOTOGRAPH

Figure 54

364

DG 80910
364



RUN 105

$\alpha = -25°$

SCHLIEREN PHOTOGRAPH

Figure 55